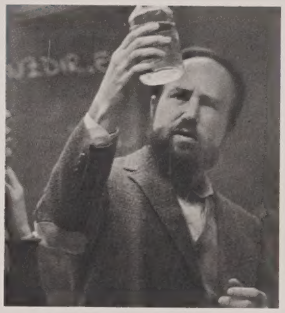
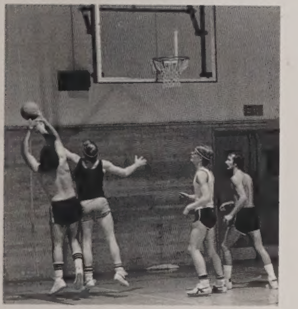
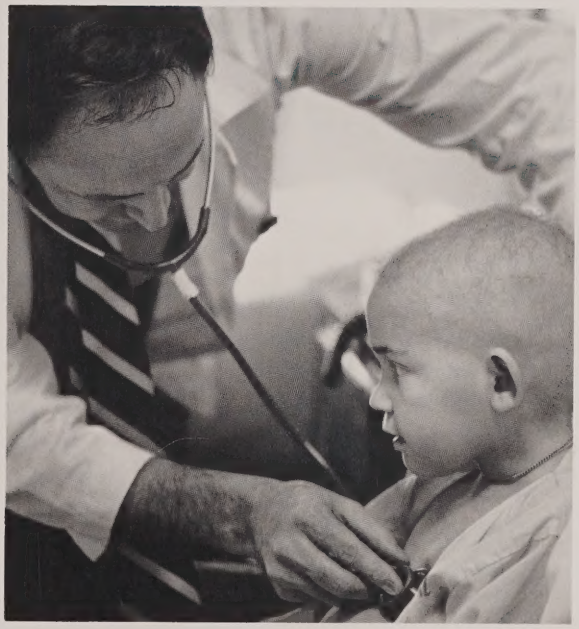
Massachusetts General Hospital Annual Report 1981

1980-81 at Massachusetts General Hospital. Activity at the MGH aims at healing, teaching, and research, and in the following pages we have highlighted our year in these terms – patients we have helped, professionals we have trained, discoveries our research scientists have contributed.

Dr. F. Sargent Cheever 2
Dr. Joseph B. Martin 4
Salvaged tissue 7
Eight-finger replant 8
NF Clinic opens 10
Occupational Health Clinic opens 11
Alcohol Clinic 13
Revere Health Center 14
MGH-Chelsea Memorial Health Care Center 14
Social Service Department 75th anniversary 16
School of Nursing: last graduation 18
MGH Institute of Health Professions: first graduation 19
Surgical fellowships 19
Artificial skin 21
Monoclonal antibody for kidney transplant 22
Donated bones 25
Tunable dye laser 26
Dr. James Clark White 26
Dr. John T. Potts 27
Peggy Stuart-Coolidge 27
Dr. Rita M. Kelley 28
Resignation of Dr. Charles A. Sanders 28
Financial Statements 29
Facts & Figures 29
The Patient's Dollar 29
Officers of the Institution 30
Members of the Corporation 30
Administration 31
Chiefs of Services 31
Ways of Giving 32

Dr. F. Sargent Cheever, Chairman of the MGH Board of Trustees.

The birthday parties of our healed patients gladden us always, but they do not generally become times of special celebration for the MGH as a whole.

The fourth birthday of Kristen Brockmeier, however – she is the young lady smiling at you from the facing page – was something apart.

Kristen was born with six abnormalities in her heart. Her stomach and intestines were connected in reverse. There was a passageway between her windpipe and her foodpipe that should not have existed.

When Kristen was two days old, she came under the care of a team of MGH specialists from cardiac and pediatric surgery and anesthesiology, supervised by Dr. Richard R. Liberthson. The team at once set about the task of diagnosing Kristen's many problems; then began a series of surgical procedures that would take a year and a half to complete, first to correct the throat problems, then the intestinal, and finally the heart.

And this year she was four and enjoyed her first big party. Let me stress that the medicine that saved Kristen's life is by no means unique to the MGH. Rather, it exemplifies the powers of teaching-hospital medical practice as a whole. What was possible with Kristen is, in a sense, what modern medicine at its best is all about.

This capability to save, to heal at the precipice, to work extraordinary cures, is based on an extraordinary labor of the entire medical community – on millions of hours of patient, skillful research that teach us how to do the many things that must be done, how to understand the many details that must be grasped, to save the life of a person like Kristen.

The national investment in medical science that was made about three decades ago has borne abundant harvest. Never have medical science and technology been more productive of new insights, new methods, new power to heal. The expense has been great, and most of this work has been – as it must continue to be – financed by public funds.

But now the federal government appears to be reducing its support of the rates of growth in medical knowledge which are scientifically attainable, and which government, the medical community, and the public alike may once have assumed would be indefinitely sustained.

Like every other major hospital in the country, the MGH came into the 1980s facing serious economic challenges, and not alone in the area of research funding, but over a broad range of basic concerns. We badly need, for example, to modernize our more historical inpatient facilities. We knew we must either find new support outside the federal government or be forced, with agony, into restricting important programs.

In February 1981 our response to this challenge was to open a campaign to raise $114 million from private, voluntary sources, far and away our largest fund-raising effort and the hospital's first general drive since 1961.

The bulk of this amount, about $80 million, is needed to upgrade our inpatient facilities. Of the hospital's 1,092 beds, 500 are in need of renovation or replacement. We need a new inpatient building to replace the aging Baker and Vincent-Burnham Buildings. We must move some walls to make room for surgical beds. We must relocate the last of the patients still cared for in the Bulfinch Building, erected in 1821.

Our target sum also includes $5.2 million to complete financing of the $32 million Ambulatory Care Center, nearing completion as our report period closed in September. The new center will replace facilities built in 1903 to handle 300 patients a day but which in fact are now managing to serve 1,400 patients a day. The nine-story Ambulatory Care Center will ultimately serve 600,000 patients a year, who will thus have access under a single roof to the array of clinics and special units now scattered throughout the hospital's many buildings.

Another $2 million is needed to complete our obligations on the Cox Center for Cancer Management, which

Kristen Brockmeier...her fourth birthday was something apart.

opened in 1977 and is now treating 18,000 patients a year, more than had been anticipated. Another $10 million will be allocated to the MGH Institute of Health Professions, which we opened last fall. And finally among the major items, the Treadwell Medical Library will receive $2 million for the microfilming of important material and for integrating the Palmer-Davis Nursing Library.

When we launched our drive, we were happy to announce a pledge of $15 million from Arthur O. and Gullan M. Wellman of Florida, formerly of Massachusetts. We believe this to be the largest single contribution ever made to an American teaching hospital or to any existing hospital. It will be used to build and equip the Wellman Research Building, in which we will consolidate in a single facility the research work currently being carried out at 75 different laboratories throughout the hospital. We know from experience of the benefits of such an environment: scientific disciplines inspire one another by contact, and a centralized research administration promotes prompt transfer of research findings into patient care. The Wellman Research Building will house on-going research projects in a broad range of medical areas but concentrating on the neurosciences, endocrinology, metabolism, nutrition, aging, skin diseases, and growth and development.

The prospects for the fund-raising drive, we think, are good. By the end of the fiscal year, about a third of the projected $114 million had been raised, largely through the extraordinary generosity of the Wellmans. We see a growing awareness that the vigor of the nation's health-care system requires now a greater infusion of support from private institutions and individuals.

But at the same time, candor and urgency oblige us to stress that the stakes are momentously high. For the question before the MGH – and before the nation's great hospitals as a whole – is whether, in a time of tightening public resources, it can find new ways to maintain its customary excellence in healing, research, and education.

And to be there for the bright-eyed Kristens when they need us.

F. Sargent Cheever.

Dr. F. Sargent Cheever

The MGH of tomorrow.

Dr. Joseph B. Martin was named interim director of the MGH in July 1981, when Dr. Charles A. Sanders resigned after nine years as General Director. Dr. Martin is Chief of the MGH Neurology Service and Bullard Professor of Neurology at Harvard Medical School.

You don't have to find yourself directing a major hospital to be concerned about the state of American medicine, but if you do, you'll worry about it all the time.

The medical community finds itself in a troubling public-policy situation. The pressure to cut nonmilitary federal expenditures across the board will obviously be felt by medical researchers and practitioners alike. We do not anticipate research cutbacks as deep as those of the 1969-72 period. But we do foresee a period of considerable uncertainty about the year-to-year levels of federal support.

The instability that this introduces is one of our most serious problems of research management. The National Institutes of Health (our principal funding agencies) are rarely able to say at the beginning of the fiscal year what projects they will support for that year, or at what dollar levels. This is not the fault of the NIH but of the policy conditions under which the total national budget is determined. But this makes it not a pinch less painful. As much as 70 percent of the MGH 1981 research budget of $37 million was federal in origin. That means, broadly, that 70 percent of our research activity is subject to significant funding instabilities.

We are not saying that the intellectual bottom is about to fall out of American medical science. But the slackening of public financial support means necessarily that at a certain point down the road we will fall behind our potential, failing to achieve what we owe our children and expect of ourselves.

The contemporary hospital's problems with government, alas, do not end with the falloff of support. Our hospitals' most vexatious and frustrating relationships are with government regulatory agencies. We know, of course, that the basic reasons for extensive regulation of medicine are to cut costs and to protect the public's health; and it goes without saying that the MGH supports these principles.

But people who do not administer hospitals can have little idea of the useless costs and delays forced upon health services by the constantly growing regulatory network. Hospitals in New York have calculated that they are regulated by 164 government agencies. Massachusetts is one of the most heavily regulated states. Some of this regulation is valuable. It has had the salutary effect of lifting the minimal standards of the overall national health care system. But it also tends to level off the top, producing mediocrity. It means that critical changes can take years to accomplish. It means that research projects are often delayed and burdened by heavy administrative costs.

Hospital administrators also worry a lot about the ever rising cost of health care. A major part of this rise results from the larger economic forces we all must live with. Part of it comes from overregulation. Another part comes from the increase of labor costs within medicine over the past several years, correcting a long-standing inequity. Part comes from the general aging of our population. Part of it comes from the emergence 15 years ago of government-sponsored medical insurance and the resulting increase in health care visits by people thus covered. And part of it comes from the fact that sophisticated, life-saving medicine is expensive, perhaps inherently.

Suppose you had $25,000 to invest in the nation's health. Would you buy a kidney transplant for some single individual? Or invest in $25,000 worth of nutritious lunches for schoolchildren who would otherwise not have them? How does our society intend to measure its priorities when the economic squeeze grows tighter?

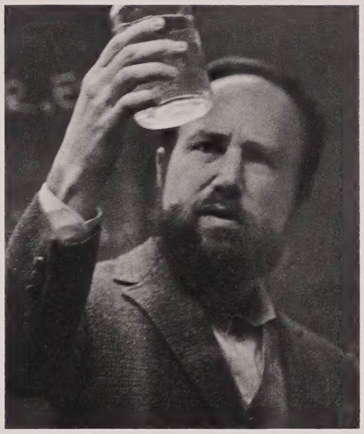
It is tragic that this kind of conflict should arise. We need to support highly specialized medicine, and we also need to extend our ability to deliver basic care to the community. These are equal needs and ought not to be set against each other.

The economic pressures on hospitals are great. Already one Massachusetts community hospital has had to close its doors, and in a few other institutions, here and there, the quality of care is starting to look a little frayed.

On the research side, at least one ray of hope in the darkening financial picture is the new willingness of private capital to support basic academic research. This has been developing for about a decade, and we welcome it. Certainly the emergence of a larger financial relationship between academic science and private industry poses a question about the independence of science. But such a question was also faced and satisfactorily handled some 30 years ago when the government for the first time began to fund scientific research in a significant way.

The arrangement reached this year between the MGH and Hoechst AG, the international chemical firm, will prove, we believe, a model for such relationships throughout the field. Hoechst has agreed to provide more than $50 million dollars over a 10-year period to support the founding of the MGH Department of Molecular Biology, which will ultimately have a staff of about 100 research scientists. In return, Hoechst will have the rights of commercial development on a standard MGH licensing arrangement of the results of the laboratory work which it directly supports.

This agreement carefully protects our traditional academic freedom. Work will be determined and directed exclusively by the laboratory itself under the regular supervision of the MGH management. Our investigators will choose their own research projects, collaborate with others, write their own scientific reports, and decide when and where to publish their results. As outgoing General Director Dr. Sanders put it, "It is both Hoechst's wish and ours that this laboratory maintain its freedom and independence."



Dr. Howard M. Goodman... his research skills attracted Hoechst.

Our thrust as a hospital is outward to the world: to heal, teach, and discover through research. We are also a family, and we have an inward life of special feelings for special people.

Renowned geneticist Dr. Howard M. Goodman, whose research skills attracted the Hoechst interest, has joined us from the University of California to head the new department, and we are confident that the venture has an exciting future. Since the discovery in 1957 of the nature of the genetic material, biology has surged dramatically ahead and now challenges physics' place as the premier science of the twentieth century. With Hoechst's support, the MGH anticipates that the new laboratory will soon be among the world leaders in the field.

Generous as it is, however, the Hoechst grant does not take the MGH out of the fiscal woods. Indeed, since the $50 plus million is designated exclusively for use by the new molecular biology department, not one cent can be applied to the other needs that beset the hospital. As we ended the fiscal year, our $114 million fund-raising drive, needed for the upgrading of our patient care facilities, still had two-thirds of the way to go.

Joseph B. Martin

Dr. Joseph B. Martin
MGH Interim General Director

A postscript on prevention. Medical science is understandably proud of its contemporary achievements—the reattachment of limbs, the transplantation of organs, the rebuilding of the innermost structures of the heart.

But such achievements have not been paralleled by achievements in the prevention of disease and illness. And prevention is always the first essential of sound health care.

The fact is that we Americans of the 1980s, without spending another dime for medical research or community-health programs, could most profoundly improve our health by taking more personal responsibility for it—by cutting out smoking, reckless driving, the abuse of alcohol and a host of other drugs, and the casual intimacy that has led to a national venereal-disease problem of frightening proportions.

Medicine as such cannot enforce a sound diet, proper exercise, and respect for the body's limits. So long as that is true, life-style will probably remain the nation's health enemy number-one.

Ten-year-old Karen Rousselle of Saco, Maine, lost her left leg below the knee when she was hit by a gravel truck last April. Doctors at nearby Biddeford's Webber Hospital rushed her to Boston along with the severed limb with the hope that MGH surgeons using microsurgical techniques could replant it.

The severity of Karen's trauma ruled that out. The limb could not have been replanted without shortening her leg by at least six inches. The real medical question with Karen was whether she would even be able to keep her knee joint. The accident had torn away the tissue surrounding it. The bone of the joint was exposed. Keeping the knee joint, of course, makes all the difference for a successful prosthesis. Without the knee, one must rotate the hip at every stride, an awkward, difficult gait. But if the knee can be saved, restoration of a near-normal walk is quite possible.

An MGH surgical and pediatrics team led by Dr. G. Gregory Gallico of the Plastic Surgical Division was with Karen in the OR within an hour of her arrival at the MGH. The surgical plan was to salvage tissue from the lost foot for use in building a covering of skin and soft tissue around the knee.

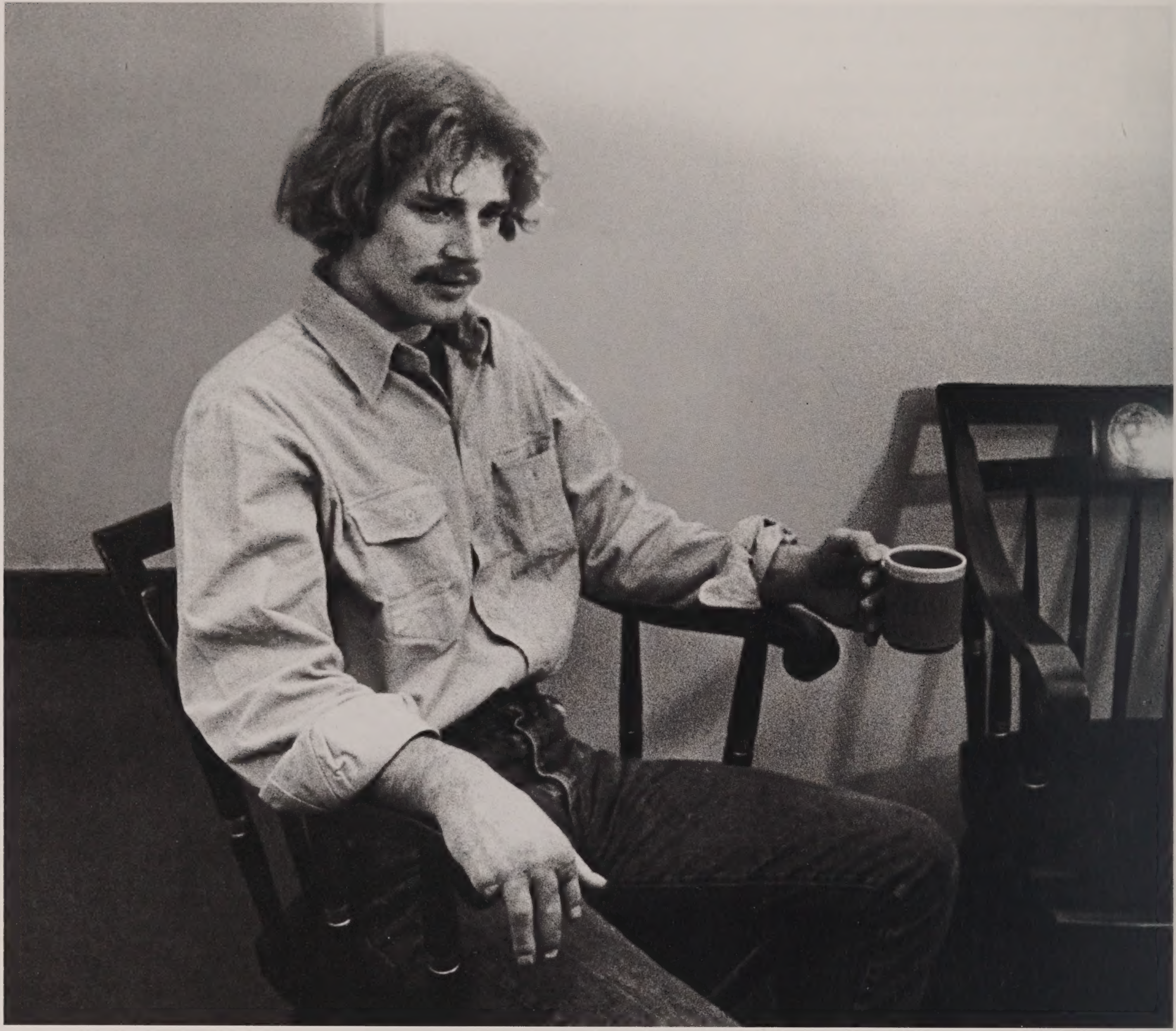
"The foot attached to the severed leg was still in good condition," said Dr. Gallico, "so we decided to remove from the foot all of the skin as well as underlying muscle, fat, nerves, and blood vessels. We would then have the ingredients to fashion a new cover, or flap, of both skin and soft tissue to protect Karen's thigh, knee, and leg bone."

The ten-hour surgery came out well. Karen was able to retain not only her knee joint but also a four- or five-inch length of bone below it, making much easier the fitting and use of an artificial leg.

Salvaged tissue has been used in this way only for about the last five years. What has made this possible, of course, is the development of the art of microsurgery, the technique of operating with a microscope and miniaturized instruments to work on structures such as vessels and nerves that are too small to be manipulated by conventional surgical methods. In 1976, MGH surgeons, Drs. James W. May, Jr. and Richard J. Smith, used such techniques to turn big toes into thumbs for a boy who had been born without the latter and with claw-like feet. Three years ago, Dr. May also used methods similar to those employed with Karen to preserve an elbow that otherwise would have required amputation.

Karen Rousselle…a knee saved.

"Before the advent of microsurgery," says Dr. May, Chief of Hand Surgery in the Plastic Surgical Division, "needed tissue was often available, but there was no effective way to transfer the material from point A to point B. Microsurgical techniques have not only solved this problem but have also focused much attention on the many potential uses for salvaged parts of the human body."



The restoration of Michael Bates' seven fingers made medical history.

Michael Bates, 21, was at his iron press in Bellows Falls, Vermont, on September 4, 1981, at 10 a.m., when something went wrong. Suddenly he had lost eight fingers to the machine.

The ambulance bearing him wheeled up to the MGH Trauma Center in Boston at 2:20 that afternoon, his severed fingers packed in ice and carried with him in a plastic container.

Replantation surgery is most successful when the digit or limb is cut cleanly. The iron press had not only taken off Mr. Bates' fingers but had also crushed nearly a three-quarter-inch segment of each one, chewing up vital parts and imbedding foreign matter from the press in the tissue. Mr. Bates' youth and good health and the obvious difficulties to which his injury would consign him prompted the MGH team to attempt the unusually demanding and arduous procedure of replanting all of his lost fingers.

One group of surgeons cleaned and prepared the severed fingers. Another group readied the stumps. To eliminate the crushed area, the team had to shorten each finger by about three quarters of an inch.

Two surgeons at a time worked on each hand, and a third pair hunched over separate microscopes to separate and label the fingers' veins, tendons, arteries, and nerves. The surgeons wired the digits back to the stumps. With sections of vein taken from Mr. Bates' forearms and feet, the doctors repaired crushed vessels about the diameter of the lead in a pencil. The specialists used microscopes to line up as many as possible of the nearly invisible fibers that make up the nerves, then whenever possible, tied them back together.

Forty-five operating people in all, including 11 plastic and orthopedic surgeons, 14 anesthesiologists, 13 nurses, and 7 technicians, worked in shifts for 46 and a half hours.

When they were done, they had replanted all eight of Michael Bates' fingers and restored circulation even in the last one to be attached, the little finger of the right hand. Later this finger lost circulation at the tip and had to be amputated.

Mr. Bates was thus the first person in history to have seven fingers successfully replanted.

Said Mr. Bates at a news conference some three weeks later, "I kept saying, 'I don't have my hands.' I never dreamed it was possible to put the fingers back."

"Replanting the fingers has greatly improved the functional potential of his hands," said the surgical team's Dr. James W. May, Jr., Chief of Hand Surgery in the Plastic Surgical Division. "Now Mr. Bates will be able to grasp objects with his hands although replanted fingers – like replanted hands and arms – can never be as good as they once were."

Beyond its benefit to Mr. Bates, the marathon operation was important, as Dr. May said, "because it demonstrates that specialists should not give up on replanting severed fingers that have been properly cooled." In fact, fellow workers recovered two of Mr. Bates' fingers only after Dr. May suggested that they search the plant again.

The lessons of the operation are thus twofold:

First, that properly cooled digits can be replanted successfully at least up to 37½ hours after severance. That is how late the blood flow was reestablished in the last of the seven fingers successfully replanted. This extends by 9½ hours the time after injury in which surgeons know they can replant fingers. The previously greatest time lapse between severance and successful replantation was the 28 hours required for MGH surgeons to restore circulation in the last of four fingers lost by a Boston bindery worker in 1979.

Second, the effort shows that even eight fingers can be replanted if a medical center has the necessary specialists in sufficient depth.

But as Dr. May was quick to point out, only the great skill of the anesthesiologists made possible the extreme length of the procedure. This stunning demonstration of the blessings of anesthesia came just a month short of the 135th anniversary of the world's first successful use of ether in a hospital, on October 16, 1846, in the Ether Dome of the MGH Bulfinch Building.

Dr. May checks Michael's finger movement.

Dr. Robert L. Martuza and patient.

Neurofibromatosis has been called "the Elephant Man's disease" ever since an English surgeon, Sir Frederick Treves, rescued John Merrick from a circus sideshow and found a home for him at London Hospital where he could be cared for and his strange and grotesquely deforming affliction studied.

Tumors and pendulous folds of skin marred almost the entire surface of Merrick's body. His head was so grossly enlarged that he had to sleep in a sitting position, his head resting on his knees. In 1890, at 27, having become through Treves' intervention a friend of London celebrities, Merrick stretched out on a bed, perhaps longing to sleep in the normal way, and the weight of his head dislocated his neck. He died of suffocation.

The disease is not widely known, but it is not uncommon, either. It affects some 100,000 Americans, although in the vast majority only to a mild degree. It is now believed that the malady is triggered by genetic changes which disrupt cells in "the neural crest," an area of the central nervous system.

New understanding of this disease is now being won through work at the MGH on acoustic neuromas, brain tumors originating on an auditory nerve. According to MGH neurosurgeon Dr. Robert L. Martuza, "We know that bilateral acoustic neuromas [tumors originating on both sides of the brain] are associated with neurofibromatosis."

A surgeon can often remove a single neuroma and preserve the patient's facial function; sometimes it is possible even to save hearing in the affected ear. But results are much less satisfactory with bilateral tumors, which encapsulate the nerves rather than pushing them away.

Now in collaboration with David T. MacLaughlin, Ph.D., and Dr. George S. Richardson, both of the MGH Gynecological Service, Dr. Martuza is trying to determine if neurofibromatosis is responsive to hormonal manipulation. The reasoning is that NF victims sometimes develop tumors of the brain's membrane covering, and these tumors, meningiomas, have a receptor for estrogen, just as do tumors of the breast. We can now treat some breast tumors by manipulation of this common female hormone. "But no one has ever done this," points out Dr. Martuza, an Assistant Professor in Surgery at Harvard Medical School, "for meningiomas or the other tumors of neurofibromatosis. If we could check the growth of multiple tumors early by some hormonal method, we could help these patients tremendously."

Dr. Martuza and his associates are also trying to develop an animal model of the disease to determine how health professionals can more readily treat this disorder.

The MGH opened an NF clinic early in February 1981 under the direction of Dr. Martuza. One of five such clinics in the United States, the new MGH unit provides patients with a single facility that can serve their special needs in neurosurgery, ophthalmology, dermatology, psychiatry, orthopedics, plastic surgery, and genetics.

Another reason for opening the NF clinic, as Dr. Martuza points out, is that the disorder can exist in a form so mild that neither the victim nor the family physician will recognize a problem. The disorder can then express itself more violently in a succeeding generation. "That's one of the special problems with this disease," says Dr. Martuza, "that it can so easily escape detection and be passed on. And it's why we see a patient's entire family."

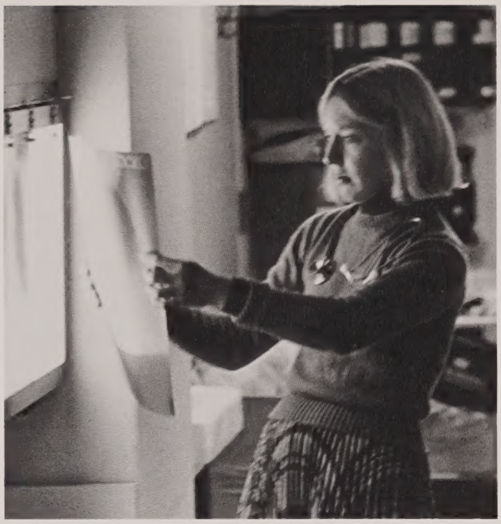
But publicity generated by recent dramatizations of John Merrick's life has lifted the taboo off public recognition of NF. People are now receiving help which in many cases they did not even suspect they required.

Diseases of the workplace strike some 390,000 Americans a year, 100,000 fatally. Up to 39 percent of all cancers are estimated to be occupational in origin. Thirteen thousand people a year die from accidents on the job.

Yet of the 350,000 practicing physicians in the United States today, only 5,000 are in occupational medicine and only about 1,000 of these are board-certified.

The MGH was therefore especially happy to announce in early July 1981 the reopening of its Occupational Health Clinic under the codirectorship of Drs. Nancy L. Sprince and Christine Oliver.

MGH's involvement with this increasingly important area of medical practice is not new. When Dr. David L. Edsall, later Dean of the Harvard Medical School, established the Industrial Clinic in 1912, the MGH became one of the first hospitals in the country to offer clinical specialization in diseases of the workplace. Then in 1949, under noted radiation-hazards researcher Dr. Harriet L. Hardy, the



Dr. Christine Oliver...getting at diseases of the workplace.

MGH opened its Occupational Health Clinic. Dr. Hardy's research into the toxic properties of beryllium established still effective worker-safety limits for exposure to this metal. The MGH has remained the keeper of the National Beryllium Registry, even though the clinic closed when Dr. Hardy retired in 1971.

Codirectors Sprince and Oliver want to avoid a repetition of that hiatus. They are therefore building into the clinic's plans a heavy emphasis on educating the MGH community itself through presentations at medical meetings by the OHC staff and by experts such as labor leaders, lawyers, corporate medical directors, and representatives of government health agencies.

Dr. Nancy L. Sprince... restoring an MGH tradition.

Says Dr. Oliver, "Occupational illness and disease are a major and underrecognized public health problem. Unless we begin to recognize the causes, we're not going to be able to prevent a lot of the illnesses that we're seeing. It's something the medical profession is really going to have to address more closely."

Dr. Oliver notes certain danger signs in the current situation of occupational health: the pullback of federal support, the current withering of the Occupational Safety and Health Administration, and the tightening of the job market, which makes workers much less willing to report job hazards.

But she is convinced that professional awareness of occupational medicine is growing. "More medical schools are beginning to include material about occupational medicine in their curriculum," says Dr. Oliver. "More physicians are becoming sensitized to occupational illness and disease. We're seeing it here at the MGH, because we're starting to get more referrals from the screening clinic and from subspecialists within the department of medicine."

The majority of the patients treated at the Occupational Health Clinic since it reopened last year have been victims of asbestosis, the lung-scarring disease that results from long-term inhaling of asbestos particles. Asbestosis is a major problem nationally. During the next 30 years, it is expected to cause two million premature deaths from cancer, a number which represents a staggering 17 percent of all cancer deaths during that period. And it is a special problem in Massachusetts because since the 1940s asbestos was used so heavily in the state's shipbuilding and repair trades. Much of the work with it has been done in tight spaces with poor ventilation.

The OHC works mostly with individual patients, but it also carries out workplace inspections to identify actual and potential health hazards. The OHC has already carried out three such site surveys in the Boston area. It is working on programs with labor unions locally and in Washington to identify work-related illnesses among their members. As a consultant to a paper mill in British Columbia, the clinic investigated a high incidence of heart disease among the workers exposed to hydrogen sulfide and methyl mercaptan, which forms methemoglobin, and recommended a remedial program.

"Occupational health," says Dr. Oliver, "is an area we are just beginning to understand. But we already know for a fact that we can make great health progress by going after the hazards of the work environment. The question now is whether or not there exists the will to do so."

About 25 years ago, the MGH treated about eight times more men alcoholics than women, but today that lead has dropped to about three to one. According to Eleanor Z. Hanna, Ph.D., director of the MGH Alcohol Clinic, it may not be long before women catch up with men altogether in this tragic vulnerability.

The clinic records about 4,000 visits and takes on about 250 new patients a year including many referred by their employers. Dr. Hanna points out that this patient population cuts across all social lines. "We are not seeing the Skid Row derelict whom most people associate with the alcoholic. We mainly see working people from intact families. And more and more of them are women."

Using a variety of techniques (medication, supportive therapy, group therapy, etc., and not always requiring total abstinence), the clinic is often able to help such people learn to cope with their problem. Dr. Hanna cites the example of a young professional woman whose alcoholism had caused her career to stagnate. "Now she's not drinking," says Dr. Hanna. "She has a teaching job in her profession, and she's got her life in order. People can learn how to beat this disease."

But overshadowing the instances of individual recovery is the larger, more ominous pattern of alcohol addiction among women, a rise which Dr. Hanna attributes to women's changing social status. "As more women enter the work force," she says, "and have more disposable income, we find the number of them seeking help at alcohol centers also rising. The cocktail party is replacing the tea party for many women. The so-called two-martini lunch is no myth."

Several important insights have emerged from the clinic's continuing three-year-old study of drinking patterns.

There is a total naivete among many female patients about their physiologic inability to tolerate as much alcohol as a man. Alcohol dilutes in blood and other body fluids. Being larger in build than the average woman, the average man can therefore absorb more alcohol into his system before drinking affects him.

Dr. Eleanor Z. Hanna seeks a deeper understanding of the social processes of alcoholism.

Additionally, men maintain a fairly consistent level of tolerance for alcohol while in women the level can be quite variable. Menstrual cycles and the use of oral contraceptives, for example, can affect the metabolism of alcohol in women.

A woman can begin to suffer a degeneration (cirrhosis) of the liver on only a third as much alcohol as a man consumes. The start of this disease in a woman would also be more rapid.

Another insight has to do with the patterns of problem drinking. Even women who drink heavily, the clinic found, rarely consumed more alcohol per social event than normal or non-problem drinkers. The difference is that problem drinkers much more frequently involve themselves in such events. "This is one reason why the difference between normal and problem drinking can so often be hard for friends to notice," says Dr. Hanna.

The aim of this study is to gain a deeper understanding of the social process of alcoholism, a sharper sensitivity to its signs, and a greater practical skill in attacking a toxic illness that has always been one of humanity's most punishing health problems.

The miracles of modern medicine can hardly count for much in the lives of real people if they are not deliverable to those who need them, when they need them, where they need them. Yet one of the least developed components of the contemporary medical system is the delivery of health care to the populations of our cities.

The MGH's commitment to a hands-on approach to the problem of community health-care delivery dates from the middle 1960s when urban people first began to assert their needs.

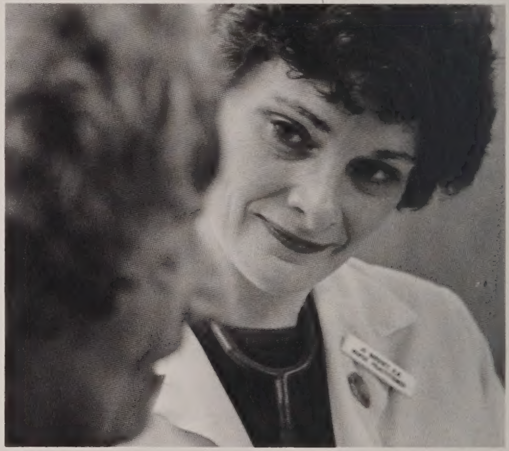
The MGH recognized that it could play a creative role in responding to these needs. In 1963, we opened the doors of a clinic at Logan Airport, then over the next few years took responsibility for other clinics at Charlestown (MGH-Bunker Hill Health Center in 1968) and in Chelsea.

And in February 1981, we assumed responsibility for managing the Revere Health Center, set up in 1973 on the initiative of the Revere city government, the Permanent Charities Foundation, and people of the community.

The RHC easily demonstrated that it was needed by the community, but the center suffered administrative growing pains, and about two years ago the RHC board offered the facility to the MGH. MGH leadership saw this as an important opportunity to extend our capabilities to a medically underserved area.

Says Dr. Roger Sweet, Medical Director of the MGH Neighborhood Health Care Groups, "The point of the Revere Health Center is that, through it, we are able to bring the enormous resources of the MGH to the community. A Revere clinic patient is just a phone call away from the surgical and subspecialty consultation resources of the MGH."

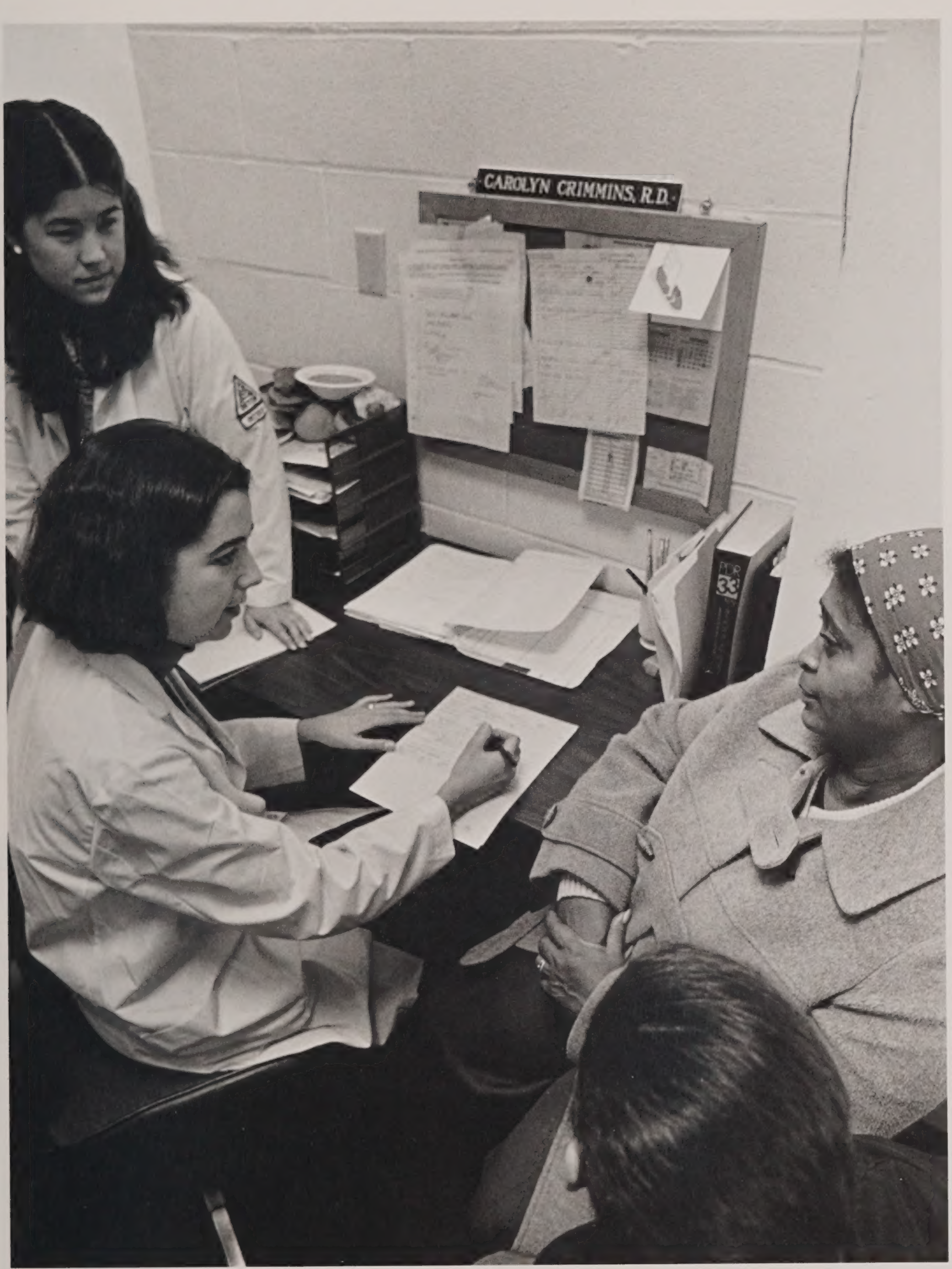
The RHC is not as yet a high-volume operation. We are currently projecting 15,000 visits annually, compared to 60,000 at Chelsea and 55,000 at Bunker Hill. But the project will grow. Comprehensive, high-quality service for the people of Revere is now assured.



Responding to community needs.

About 10 years ago, the city of Chelsea realized that its retiring doctors were not being replaced, that its medical facilities were increasingly overburdened, and that the city faced a potential health-care shortage of serious magnitude.

In response to those needs the MGH launched the MGH-Chelsea Health Center in the early 1970s. At first, this was only a small-scale pediatric service operating out of the basement of the Horace Mann Baptist Church. But it was quick to grow, systematically adding staff in adult and adolescent medicine, obstetrics and gynecology, social service, mental health, nutrition, dentistry, and physical therapy. In 1973, the center expanded into the for-


CAROLYN CRIMMINS, R.D.

New quarters for a growing health center.

mer nurses' residence at the Chelsea Memorial Hospital.

More recently, the trustees of Chelsea Memorial asked the MGH – and the MGH agreed – to take over the operation of the Chelsea Memorial Hospital itself, converting it into an ambulatory center to supplement the cramped former nursing structure. The MGH also agreed to maintain a 24-hour emergency ward and a 10-bed inpatient unit. Along with this change, the MGH also reorganized the Chelsea Memorial Hospital staff, and gave the center a new name: the Chelsea Memorial Health Care Center of the MGH. The center moved into its main quarters in the Chelsea Memorial building in June of 1981.

Says Dr. Sweet of the MGH Neighborhood Health Care Groups, "The Chelsea facility is now established as a comprehensive health center which any community would be proud of."

Dr. Richard C. Cabot of the MGH Outpatient Department, as it was then called, sat down one day in June, 1905, and drafted a letter that would later prove important in the annals of health care.

Writing to several of the hospital's closest friends, Dr. Cabot told them that, in his experience, fully a tenth of the some 500 patients then visiting the MGH clinics every day were sick from no germ, poison, or accident. In fact, they were ill because of something missing in their lives: a sense of confidence within the social world, a feeling that they could take care of themselves somehow. Patients often worsened their illnesses, too, observed Dr. Cabot, out of sheer worry – about their jobs, their families, their futures. And it was clear to Dr. Cabot that the patient's total social and mental condition had a great impact on healing and recovery. Yet medicine had no regular method for collecting data on patients' lives or for providing social support through periods of treatment and recuperation.

Dr. Cabot therefore proposed something new: that the MGH create the position of social worker, whose task would be to tend to the social context of the healing process. The idea found favor and financing. On the first of October that year (how quickly great things could happen then!), across the corridor from the lunch counter in the Outpatient Department there appeared a new desk and a new person and a new major role in the practice of medicine.

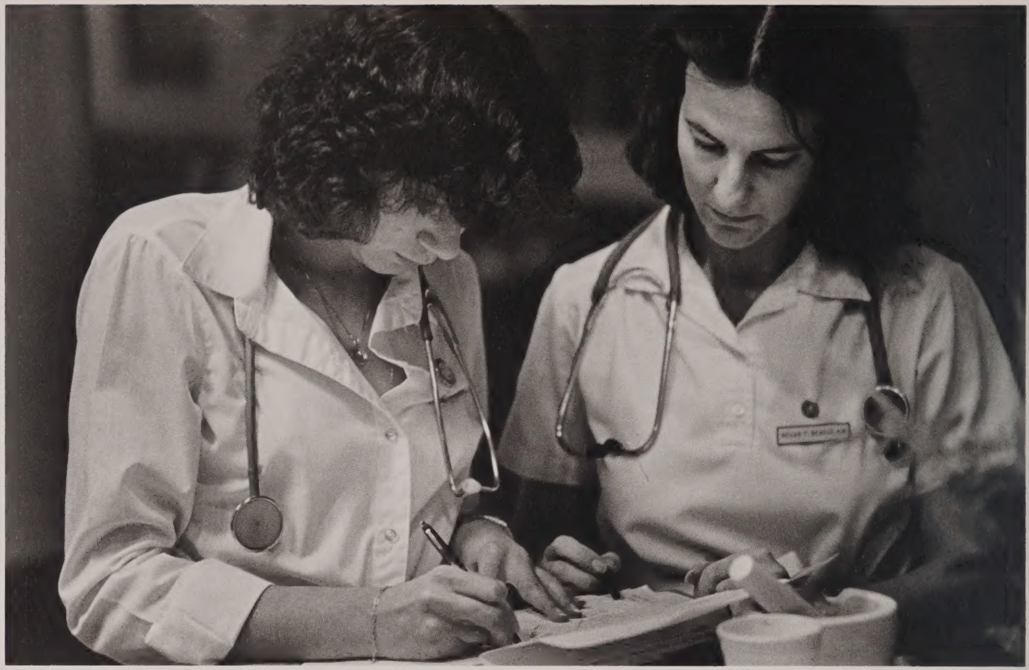
The social-worker idea was immediately successful, was recognized as such, and was widely copied. By 1981, that single desk in the corridor had become a Social Service Department with a staff of 114 health professionals, outposts throughout the hospital, and an annual caseload of almost 40,000 patients.

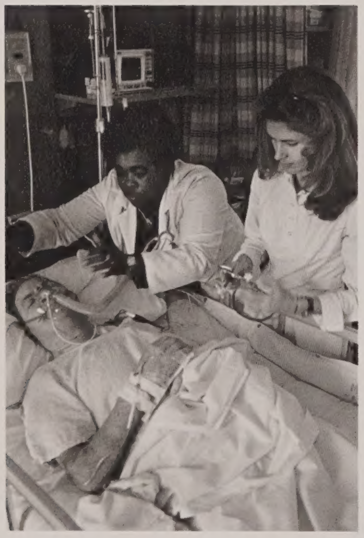
The social services concept has evolved greatly in the 75 years since Dr. Cabot gave it basic definition, in part because of the proliferation of services and of agencies active in health care delivery. Says Eleanor Clark, Director of the Social Service Department for the past 16 years, "Patients often simply don't have the capacity to find their own way through that intricate system – or nonsystem – that exists out in the field. There is a resource for virtually anything that any patient may need, but sometimes it almost takes a Ph.D. to learn where the resource is, and how to work out the procedure necessary to get the patient into the system."

But despite the great changes in technical detail, the Social Service Department's goals are today, as Miss Clark says, "exactly the same as those outlined by Dr. Cabot. Our responsibility is to assist the patient in making the best use of medical care."

Miss Eleanor Clark, Director of the oldest hospital Social Service Department in the world.
A tradition for more than three-quarters of a century.

Today's nurses need to know many times more than doctors once did.





There was some resistance in 1873 when Sarah Cabot and Mrs. Samuel Parkman went before the MGH Board of Trustees to propose that the hospital serve as the site of instruction for the newly proposed training school for nurses. This was not altogether a novel idea then: Florence Nightingale was operating her path-breaking school in London (which Mrs. Parkman had seen), and two other nursing schools opened in the United States at about this time. However, the dominant view within the medical community was still that nurses were best trained at the sickbed.

But Miss Cabot and Mrs. Parkman (whose families were close to the MGH) argued that nursing was in need of professionalization. A first-rate teaching hospital such as the MGH ought to be involved in that process.

The two women were persuasive. Their project won "experimental" approval.

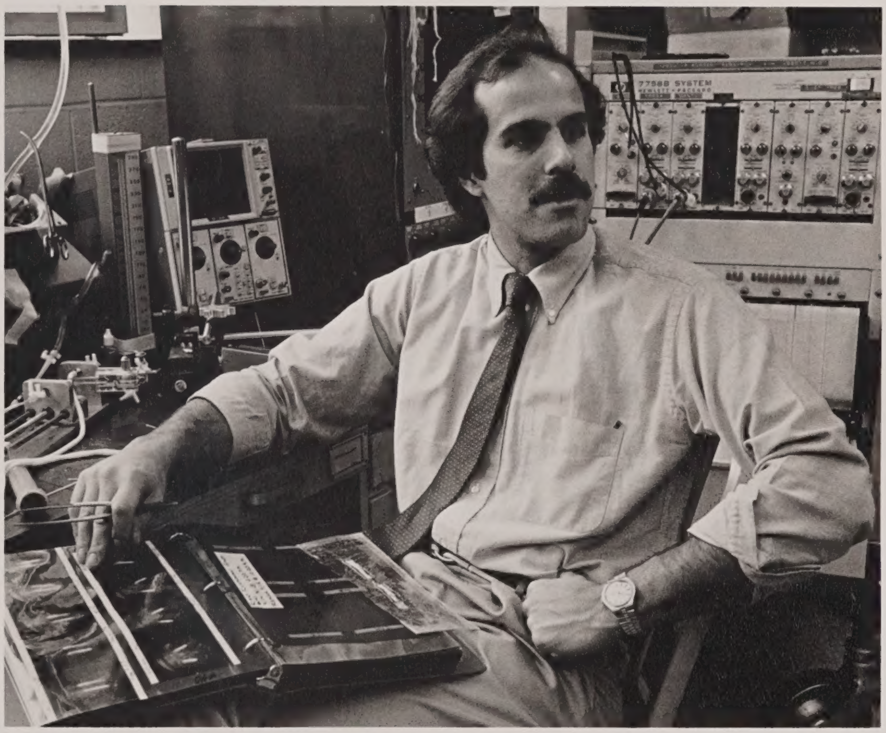
The experiment that was thus set up in 1873 as the Boston Training School became the MGH Training School for Nurses in 1896 and in 1940 the MGH School of Nursing. Each change of name brought with it an institutional and pedagogical evolution that moved nursing toward higher levels of technical competence, an expanding knowledge base, and a widening range of professional practice. For the last fifteen years, Miss Natalie Petzold has upheld these standards as Director of the MGH School of Nursing.

In May 1981 this experiment took another turn in its evolution as the School of Nursing graduated its last diploma class – 108 years and 7,943 graduates after Parkman and Cabot recruited their first four students, and the Master's of Science in Nursing Program began in the MGH's new Institute of Health Professions (see below). The transition was prompted explicitly by the maturing of nursing as a major health profession. Today's nurses need to know many times more than doctors knew when the MGH nurse-education experiment first began. This fact will be addressed in the educational framework provided by the nursing faculty under the leadership of Dr. Roslyn R. Elms, who was named the first director of the graduate program in nursing.

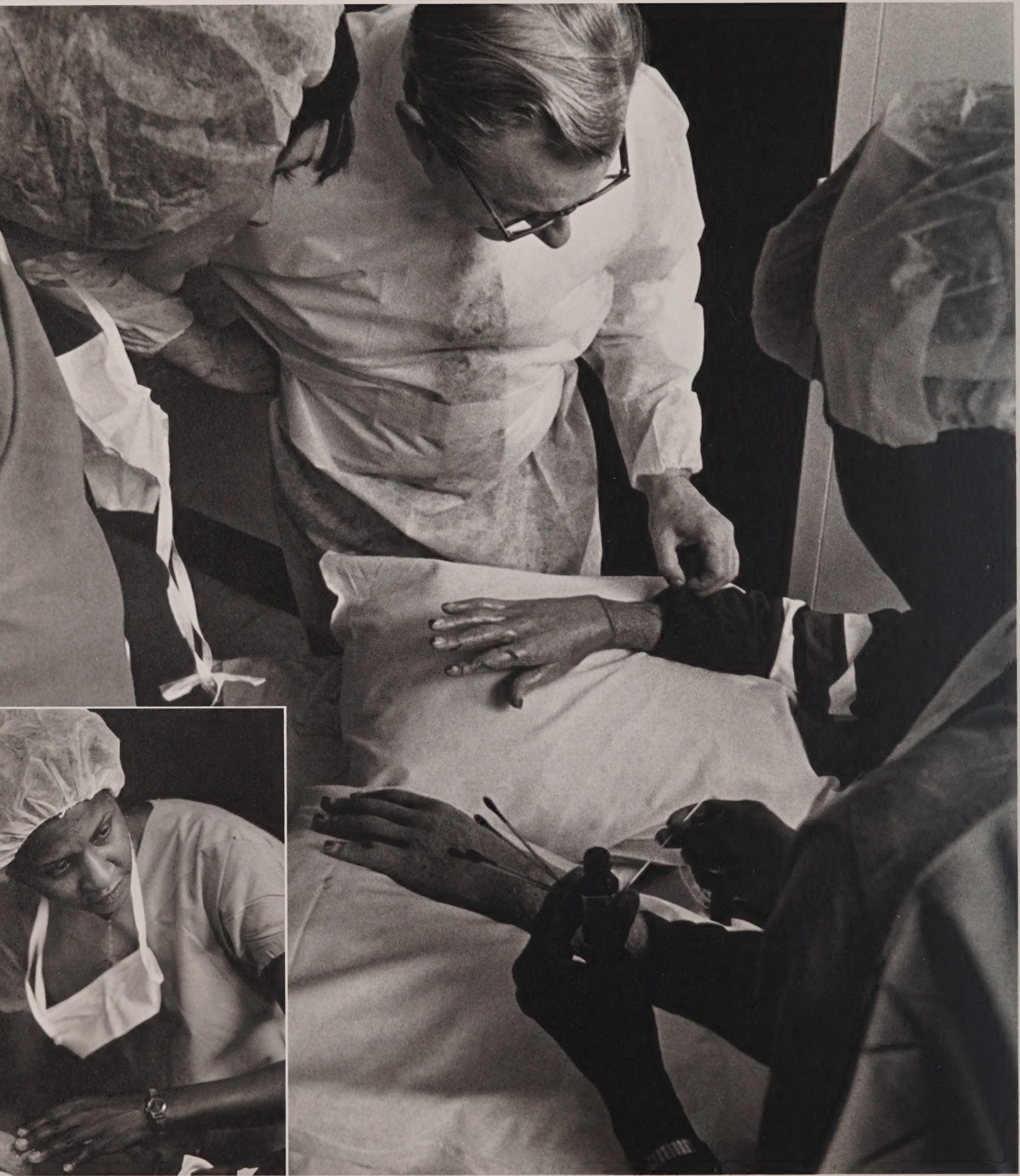
As the last class of the School of Nursing graduated in May, the first class of students in the Institute's social work program prepared to graduate. The Cabot-Parkman experiment has not ended. It has once again a new name and a new form.

Nursing does make a difference at the MGH. That was the theme of the first annual Nurse Appreciation Week, held May 4-10. The week's activities culminated with Nurse Recognition Ceremonies, in which nurses were cited for individual achievements and a proclamation signed by Governor King was read. Here, Miss Mary E. Macdonald, Director of the MGH Department of Nursing, acknowledges applause from the audience during the Recognition Day ceremony.

Under a new research fellowship established this year by the General Surgical Services, Dr. Richard Cambria, one of 63 MGH surgical residents, is investigating problems of blood clotting in artificial vessels. The fellowship is one of five named in honor of MGH surgeons Linton, Kazanjian, Welch, Bartlett, and Churchill. (Dr. Cambria holds the Linton fellowship.) The purpose is to give surgical residents an opportunity to do significant research in their areas of specialization.



The MGH Institute of Health Professions graduated its first students on August 7, 1981. In planning for about seven years, the Institute puts the hospital's educational programs into a solid academic framework. The four graduates were members of the Social Work in Health Care Program. The 40 students enrolled in the Institute will double next year and continue rising until the Institute has from 300 to 350 students, about 150 of whom will be in the nursing program. The Institute will offer master of science degrees in nursing, physical therapy, dietetics, and speech-language pathology; bachelor of science degrees in radiologic technology and respiratory therapy; and a graduate certificate in social work and health care.



Dr. John F. Burke.

Bad burns covering large parts of the body have always been among the most difficult injuries to treat. Donated skin grafts will be rejected unless the body's immune system is suppressed, but immunosuppressive drugs also increase considerably the risk of infection.

But now in a new technique involving the use of an artificial skin, MGH physicians at the MGH Burn Unit and at the Shriners Burns Institute have achieved excellent results with a series of 10 severely burned patients of whom three would probably have died without the new procedure.

The man-made skin that makes this possible was developed through a 10-year collaboration between researchers at the MGH-Shriners and Dr. Ioannis V. Yannas at the Massachusetts Institute of Technology. Dr. John F. Burke, Chief of the MGH Burn Unit and the Helen Andrus Benedict Professor of Surgery at Harvard Medical School, emphasizes that neither the MGH-Shriners nor the MIT team "could have succeeded alone. We at the MGH needed the engineering know-how that MIT could provide, and they needed our medical expertise."

The significant property of the new skin is that it is not rejected by the recipient's immune system. It therefore eliminates the need for immunosuppressive medication and thus radically curtails the risk of infection. Says Dr. Burke, "We designed our material specifically to interact with the wound bed. No other skin that I know of really does that in the same way. There is no question that the skin we've used is more compatible with human tissue than is any other."

The first 10 patients treated by the research team ranged in age from 3 years to 60. They all suffered from third-degree (full-skin thickness) burns extending over 50 to 90 percent of their bodies. The follow-up period is still just two years with the earliest patient and a half year in the latest, but Dr. Burke says the research team believes "there is sufficient evidence to indicate that the artificial skin, as designed, has provided a satisfactory skin substitute."

In none of the 10 cases has there been rejection, infection, or inflammation in the grafted areas. It is still too early to tell the long-term cosmetic effects, but among the more than 30 patients who have by now received the substitute skin, no large scars have as yet developed; wound contractures have been minimal; and the new skin looks more like normal skin as time passes. At this early date, in fact, the team believes cosmetic results with the new skin surpass those attained through traditional methods.

The artificial skin is a two-layer membrane, like natural skin. The underlying (dermal) layer is made of cowhide collagen, the binding material in animal tissue, and a substance taken from the cartilage of sharks. The epidermal or top layer is made of Silastic, a medical-grade, rubbery plastic which is removed in three to four weeks and replaced by healthy epidermis by then available from the patient's own body.

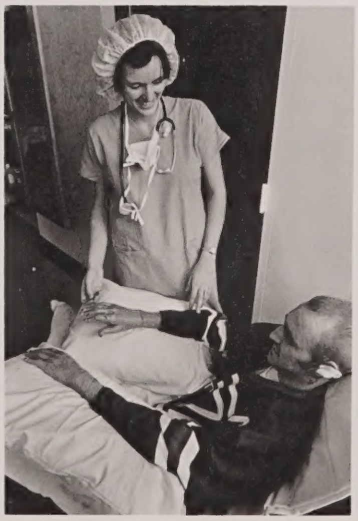
When the artificial skin is placed on the wound, as Dr. Burke explains, cells migrate into a pattern provided by the dermal implant and begin to make more collagen. As this occurs, the implanted collagen breaks down. This is similar to the normal process by which connective tissue slowly turns over throughout life. The cells are doing what they are supposed to do.

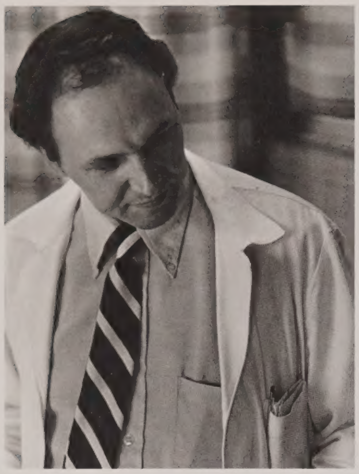
The new skin is simple to manufacture and can be stored at room temperature for long periods. "We are firmly convinced," says Dr. Burke, "that the artificial skin is better than anything else now available for the management of acute burns."

Mark Walsh, 25, an electrician, was at work last fall consulting at an aerosol-can factory in Holbrook when a violent explosion flashed through the building. Mr. Walsh was one of 24 persons injured in the blast, four of whom eventually died. In that horrifying split second, he lost 40 pounds of flesh and 80 percent of his skin.

Cared for initially at the Brockton and Carney Hospitals, Mr. Walsh came to the MGH four days after the accident, his greatest problem by then being the infection that plagues and overcomes so many burn victims. A surgical team led by Dr. Burke immediately harvested as much of his undamaged skin as could be spared for transplant to the burned area, but they quickly ran short and turned to artificial skin, using about eight square feet of the experimental substitute to cover Mr. Walsh's neck, chest, abdomen, and arms.

About two months later, in time for Christmas, Mr. Walsh was discharged. His walk was slow, and he had a year or so of physical therapy before him. But he was without dramatic scars, he said he was feeling "great," and he ordered a two-inch steak for his homecoming.





Dr. A. Benedict Cosimi, above, goes over data, below, on kidney transplantation work study program with Carolyn Bill (center), a transplant recipient, and Debra Whitaker, R.N.

MGH patient Mr. R. flourished for the first week after his kidney transplantation last spring, but on the seventh day his kidney function sharply deteriorated. A biopsy showed that his body was rejecting the new kidney.

Rejection is the major hurdle limiting the success rate of most types of transplantation surgery, whether the donated tissue is skin, kidney, or other organs. Unless the transplanted tissue is that of a genetically close blood relative, the recipient's immune system will read it as a foreign body and try to reject it by mobilizing a formidable cellular and antibody assault.

To block this natural but counterproductive reaction, physicians conventionally employ drugs to weaken the recipient's total immunological response. This helps to save the transplant but also drastically increases the risk of infection.

Mr. R.'s predicament was therefore an unfortunately common one for transplantation patients receiving their kidney from an unrelated donor. Such transplantations have a national one-year survival rate of about 55 percent. The rate has been somewhat better at the MGH – 60 to 65 percent – but even that is distressingly low.

But now a new technique, tested last year with Mr. R. and nine other MGH patients, appears to have reversed rejection in all 10 and with a much lower risk of infection than with conventional medication which suppresses the entire immune system.

Employed by a group of medical scientists at the MGH in collaboration with New Jersey's Ortho Pharmaceutical Company and Ortho Diagnostic Systems, Inc., of Westwood, Mass., the new treatment is based on the observation that the particular cell most important in mounting the rejection process is the white blood cell called the T-lymphocyte or "T-cell." If T-cells could be suppressed without compromising the rest of the immune system, then the process apparently most responsible for transplant rejection

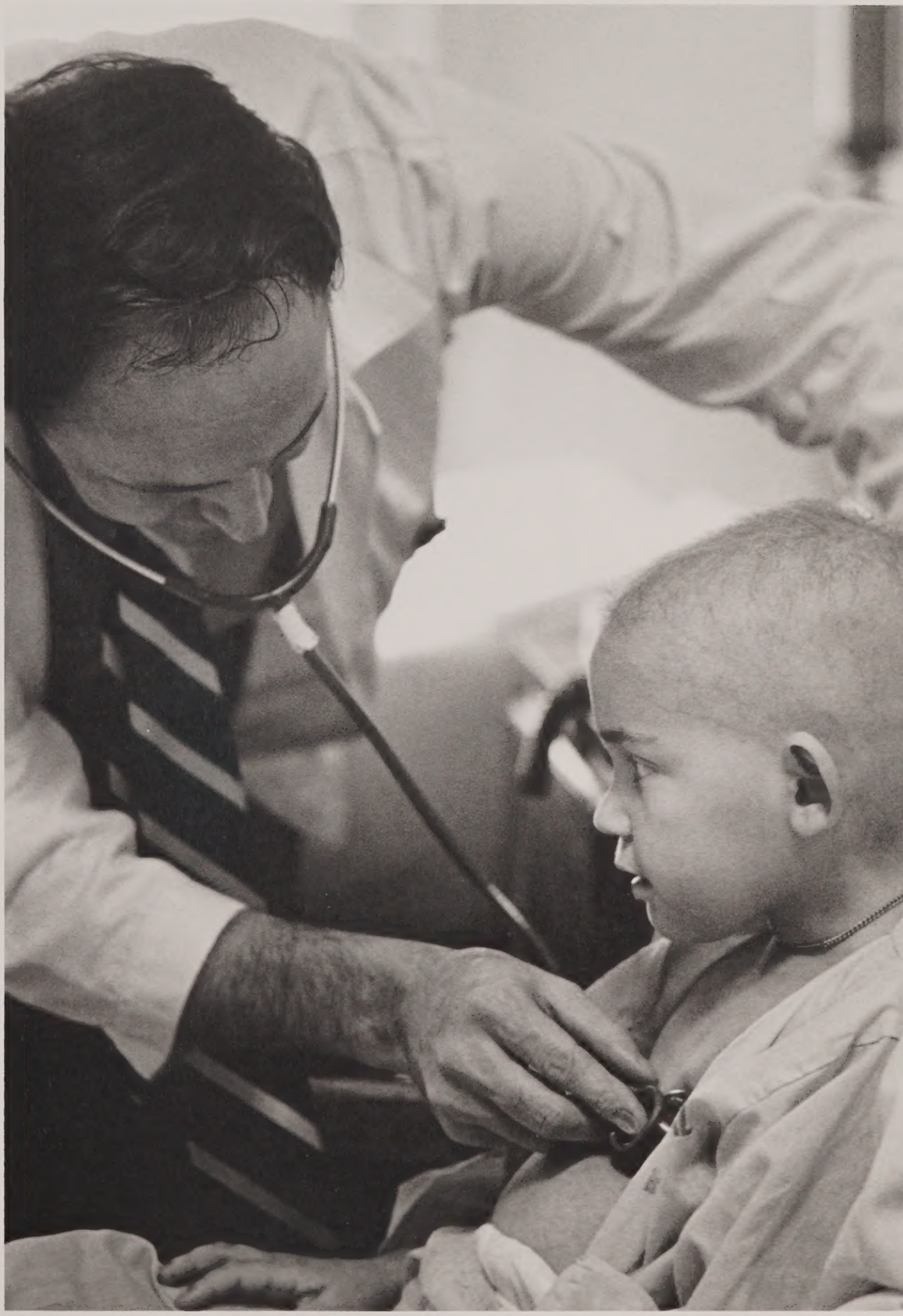
could be overcome, and many of the risks involved in obstructing the body's entire immunological defenses could be avoided.

The MGH-Ortho team has utilized a "monoclonal antibody" that targets specifically on human T-cells. The process for producing such antibodies is complex but elegant. In the first step, human T-cells are injected into mice which normally produce in addition to many irrelevant antibodies, some antibodies which react only with the T-cells. The spleen from the immunized mouse is then extracted, and individual antibody-producing spleen cells are fused to individual mouse bone-marrow cancer cells to form a hybrid cell called a hybridoma. Each hybridoma expresses both the splenocyte's property of specific antibody production and the "immortal" character of the cancer cell. Carefully selected hybridomas (which produce only the desired antibodies, in this case, reactive with the human T-cell) are then maintained indefinitely, either in tissue culture or another mouse. Since the antibody produced by each hybridoma is the product of a single-cell line or clone, it is termed a "monoclonal" antibody.

It is still early in the game for determining the exact value of this method in treating transplant patients. Monoclonal antibodies are being used in many areas of study at numerous medical centers, but the MGH 10 appear to be the first transplant patients to receive this treatment. As of the close of our report period, only two of the 10 MGH patients had been followed for longer than a year. Follow-up on the others ranged from three to nine months. When the research group reported the first two cases in the *New England Journal of Medicine* last August, principal author Dr. A. Benedict Cosimi, MGH Chief of Clinical Transplantation Surgery, commented: "Generally we don't talk about survival results until at least a year's follow-up time has passed. But we can't help feeling that the results so far are very promising."

Dr. Cosimi is confident that the technique can be useful in controlling the rejection of other organs as well, but current work is concentrated on further refining this approach with kidney transplantation patients. "The antibody now being used," says Dr. Cosimi, "affects all T-cells. We'd like to administer a monoclonal that will deal even more specifically with a population of T-cells, the one most intimately involved with rejection. I think that we'll be down to manipulation of subsets of T-cells within several years."

Checking on a young patient.



William Kennedy was 30 and vigorous when he learned that he had a malignant tumor on the bone of his right leg, just below the knee.

His only alternative to loss of his leg by amputation was an allograft – a surgical procedure involving the transplantation of a bone from a deceased donor, after the removal of his own cancerous bone.

Mr. Kennedy says he did not hesitate to choose the allograft, despite its experimental character. He is an active person. He is an assistant district attorney in Middlesex County, and he plays a solid point guard on the basketball court. He did not want to lose his leg.

Bone allografts have been performed since at least 1908, according to Dr. Henry J. Mankin, Chief of the MGH Orthopaedic Service, who carried out Mr. Kennedy's surgery. "But they were very capricious and unpredictable," says Dr. Mankin, chiefly because the cartilage of the donated bone needed to be alive in order to maintain a normal joint, while the donated bone itself needed to be dead in order to minimize chances of immunological rejection.

"We hit upon a scheme," says Dr. Mankin, "of what we call cryopreservation – a freezing process using a solution of 10 percent glycerol – that allows us to preserve the cartilage in a viable state." Dr. Mankin and Dr. William W. Tomford, director of the MGH Bone Bank, were able to show that if the cartilage is immersed in such a solution before it is frozen, then the tissue will remain viable for 5 to 10 years at minus 80°C (minus 112°F). "This makes allografts more predictable, more acceptable by the body," says Dr. Mankin, "and it gives us a simpler system for preserving the joint. So we've made what was always a dream into more of a reality."

Within six months of his operation – the fifty-sixth cadaver-bone transplantation performed by Dr. Mankin and his staff since 1971 – William Kennedy was back on the basketball court, well on the road to full functional recovery. He rides a bicycle, swims, and walks without a limp. "I suppose I unconsciously favor the leg," he says, "but at the same time I feel it growing stronger every day."

Thanks to a bone like the one shown left, William Kennedy, far left, can go for a jump shot or, below, fight for a loose ball.

By the close of 1981, Dr. Mankin and his staff had performed their one hundred and twenty-first allograft and were completing a review of the first 61 cases for presentation in a 1982 issue of *Cancer.* Dr. Mankin's estimate is that three-quarters of his staff's patients come out with good to excellent results ("excellent" meaning that the patient, like Mr. Kennedy, can resume competitive recreational activities). For some patients, amputation eventually proved necessary; with a few others, the tumor spread. "But for all patients," says Dr. Mankin, "no treatment offered as much hope as an allograft."

The procedure has been used with success on nontumor victims as well – a girl, now living a normal life, whose left thigh had been virtually destroyed by a genetic disease called fibrous dysplasia; a young man whose legs had been crushed in an auto accident, and who now can walk.

But work at MGH is concentrated mainly on tumors because this is where the need is greatest. "The work is arduous and complicated," says Dr. Mankin, "but if we can prove this system works, we will be able to expand our efforts into a whole gamut of orthopedic afflictions."

Dr. John A. Parrish, above, on left, adjusts tunable dye laser with physicist R. Rox Anderson.

In June 1981, the MGH's Dr. John A. Parrish, a dermatologist who directs the Wellman Research Laboratories, reported that a tunable dye laser, employed in medicine until then only as a research tool, had shown clinically that it could destroy target cells in skin without harming surrounding tissue.

Volunteers in the investigation, including Dr. Parrish and other researchers, exposed themselves to beams from either the experimental dye laser or the argon laser today commonly used in surgery. (The sensation, they report, is that of a pinprick.)

The target in each exposure was a tiny portion of a superficial blood vessel on the forearm. The argon laser requires higher energy and a longer pulse than the dye laser, and this often results in damage to healthy surrounding tissue as well as to the targeted growth. The research team theorized that the dye laser could overcome this problem because its wavelength can be precisely tuned (through a change of prisms and fluorescent dye) so that most of its energy is absorbed by a tiny area in the vessel (hemoglobin).

Indeed, analysis of biopsy specimens taken after each dye-laser exposure showed the desired damage to the vessel but none to such neighboring structures as sweat glands, hair follicles, collagen (the framework for tissue), or connective tissue.

The dye laser may be immediately applicable to the treatment of some port wine stains, or hemangiomas, birthmarks created when spaces in skin fill with blood. More speculatively, notes Dr. Parrish, the tunable dye laser may prove useful at altering structures within the brain, eye, and other delicate parts of the body. The research team thinks it will also be possible to use the same properties of the dye laser to selectively activate or deactivate specially designed light-sensitive drugs supplied by mouth or injection.

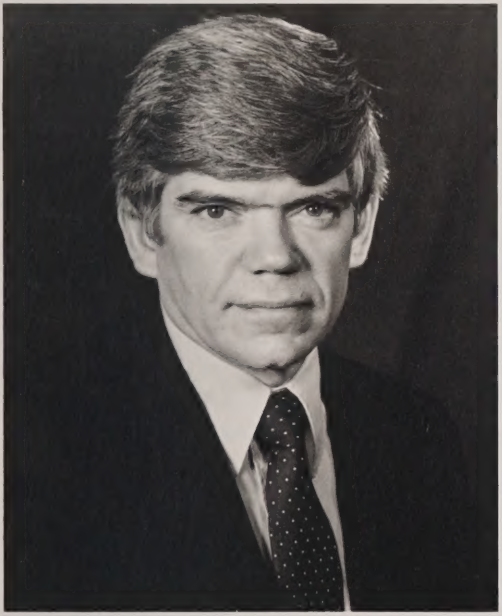
Dr. James Clark White was described by his colleagues as the world's premier surgeon and scientist in the field of the autonomic nervous system. In 1935, he published *"The Autonomic Nervous System: Anatomy, Physiology, and Surgical Applications,"* which remains in subsequent editions the standard text in the field. During his half-century at MGH, he created a training program in neurosurgery that set the pattern for the world.

Dr. White's grandfather and namesake was America's first professor of diseases of the skin and founded the MGH Department of Dermatology. His father, Dr. Charles J. White, was later the chief of that department.

The neurosurgeon's death at his home in Brookline on January 7, 1981, a month short of his 86th birthday, ended three consecutive generations of affiliation with the MGH by illustrious doctors of his family.

When Dr. John T. Potts, Jr., became Chief of General Medical Services of the MGH last May, he declared that his primary goal in this critical position would be to "rekindle a spirit of oneness in a continuing pursuit of excellence in patient care, education, and research."

The need for constantly reemphasizing the essential unity of medical science, practice, and education arises from the complexity and scope of contemporary medicine, which tend to isolate researchers from practitioners, practitioners from teachers and students, and all the subspecialties from each other.



"The MGH Department of Medicine," says Dr. Potts, "is vastly larger than in 1957 when I began training here as a resident. Difficulties that size imposes on personal communication and especially the impact of ever increasing state and federal regulations governing reimbursement and health policy have introduced elements which naturally tend to dampen enthusiasm."

Dr. Potts, who succeeds Dr. Alexander Leaf as Chief of the hospital's largest service, has been widely acclaimed for achieving the desired sense of oneness within the MGH Endocrine Unit, of which he was appointed Chief in 1968. This unit's training program, instituted by Dr. Potts, has attracted national notice because of its unusual structure in which five autonomous MGH units (thyroid, diabetes, and three endocrine subspecialties) voluntarily integrate their efforts in care, teaching, and research.

Dr. Potts himself is a physician and a researcher as well as a teacher, combining in his professional life the three larger spheres of medical activity. He is internationally known for basic research on calcium metabolism and the hormonal mechanisms that govern it, and colleagues have called his research unit in calcium and bone metabolism "the most versatile, productive, and broad-ranging in the world." Dr. Potts' research group has recently adopted recombinant DNA techniques to study hormonal controls within thyroid and parathyroid tissue.

Mrs. Peggy Stuart-Coolidge, a native of Boston and a resident of Cushing, Maine, was one of America's foremost women composers. To our best knowledge, she was the only one with an album devoted exclusively to her symphonic compositions. In 1970 she was the guest of the Union of Soviet Composers in Moscow, where Aram Khachaturian conducted a program of her works. In 1976, she was cited by the U.S. Congress for her contribution to international understanding through music.

Just before she died of cancer at age 67 in May 1981, Mrs. Stuart-Coolidge, a patient at the MGH 17 times during the last four years of her life, requested that one of her works, "The Pioneer Dances," be dedicated to the MGH and performed at the annual MGH Night at the Boston Pops.

On June 10, under John Williams' baton, the wish came true.

Coming into medicine at a time when to be a woman and a doctor was in itself to be a pioneer, Dr. Rita Marie Kelley carried out research on the use of hormones in cancer treatment and on chemotherapy in breast cancer. Her fame, however, rests as an internationally known cancer specialist whose compassion and skill endeared her to hundreds of patients.

Dr. Kelley was acting chief of the Medical Oncology Unit from 1973 to 1976. She joined the Harvard Medical School faculty in 1951 and in 1980 was promoted to its highest rank. She held honorary doctorates from Suffolk University and Boston State College and the Bronze Medal of the American Cancer Society.

The MGH lost one of its most cherished people when Dr. Kelley died on July 22 at age 64 after a three-year fight with an incurable cancer. The world lost someone whom Mrs. Michael Dukakis, wife of the former Massachusetts Governor, called a saint.

The seventeenth General Director of the MGH began his tenure nine years ago with the declaration, "I do not plan to let this hospital languish on its past glories."

The promise was well kept. It is mainly because of decisions Dr. Charles Addison Sanders made when he first assumed leadership of the hospital in 1972 that we closed the 1981 fiscal year only months away from opening our new Ambulatory Care Center. He brought about the founding of the MGH Institute of Health Professions. He organized and launched last February the hospital's $114 million fund-raising drive. He was the driving force behind the $50-plus million grant from Hoechst AG for the funding of our new Department of Molecular Biology.

When Dr. Sanders resigned last July to take a senior position with E. R. Squibb and Sons of Princeton, N.J., the MGH was stronger than he found it in each of its intersecting realms of healing, teaching, and research.

C.A. SANDERS. M.D.

Dr. Charles A. Sanders shows one of his gifts to the large number of employees who attended his farewell party. Mrs. Sanders, on left, beams her approval of the gift, symbolic of one of the products of his new firm.

The General Hospital Corporation, Boston, Massachusetts 02114

Excerpts from audited financial statements

		1981*	1980*
Income	From patient care	$228,909,097	$198,794,812
	(Less free care and contractual allowances)	28,531,511	22,415,363
		200,377,586	176,379,449
	Research & other specific purposes	59,786,427**	20,851,087
	Indirect Cost Recoveries	7,442,683	5,583,743
		67,229,110	26,434,830
	Other	12,269,561	11,122,042
	Total Operating Revenue	279,876,257	213,936,321
Expenditures	For operating expenses:		
	Salaries & wages	118,582,319	105,305,534
	Supplies, expenses, other charges	104,650,767	88,940,556
		223,233,086	194,246,090
	Research & other specific expenses	59,786,427**	20,851,087
		283,019,513	215,097,177
	Surplus (Loss) from operations	(3,143,256)	(1,160,856)
	Endowment & other income	3,453,175	1,416,508
	Surplus (Loss)	$ 309,919	$ 255,652
	Cumulative effect on prior years of change in accounting for vacation compensation net of $3,434,148 related third-party reimbursement		2,506,019
	Net Surplus (Deficit)		$ (2,250,367)

*Years ending September 30

**Basis of reporting changed to include activities previously unreported.

The MGH in 1980/81: Facts and Figures

Beds	1,092	Residents	415
Number of Admissions	30,498	Clinical Fellows	240
Number of Ambulatory Care (Clinic) Visits	451,706	Research Fellows	130
		RN's	911
Emergency Ward Visits	88,566	LPN's	155
Inpatient Surgery	19,481	Nursing Assistants	97
Day (outpatient) surgery	5,713	Volunteers	892
Active Staff	1,150	Employees	8,000+

The Patient's Dollar:

X Ray/Pharmacy/Laboratories/Medical Records/Resident M.D.s/Social Service/Supplies, etc.	37.5¢
Nursing	33.5¢
Utilities/Housekeeping/Maintenance/Laundry, etc.	11.2¢
Food and Special Diets	10.9¢
Business Office	6.9¢

Massachusetts General Hospital

Officers of the Institution, 1980

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President

Francis H. Burr, Esq.
Vice-President

G. Lamar Crittenden
Treasurer

Orrin G. Wood, Jr.
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Ways of giving. From its founding in 1811 to the present, the Massachusetts General Hospital has been a monument to the generosity of private citizens. The simplest method of giving to the hospital is the gift of cash, but it is also possible to give securities, personal property, real estate, or life insurance. In addition, many companies have matching gift programs that double or even triple the value of a gift given to the MGH.

For an individual who has a greater annual income than is needed for current expenses, a Charitable Lead Trust, or the contribution of an "income" interest made by a transfer of property into a trust, may be appropriate.

It is also possible to take advantage of the various Life Income Plans offered by the hospital. The Pooled Income Fund, for instance, is a trust in which contributions of many donors who have retained life interests are pooled, operating in a fashion similar to a mutual fund. Other life income plans tailored to the specific needs of the donor are available.

Benefaction through bequests has played a vital part in the growth and development of the MGH. Funds may be left in the form of a cash bequest; a bequest of all or a stated percentage of the residue of an estate, or a bequest of a remainder annuity trust or unitrust.

Should you plan to include the hospital in your will, or should you be interested in one of the types of gifts described, the hospital could suggest to you or your lawyer specific wording for carrying out your wishes.

Please contact Joseph C. Donnelly, Jr., Director of Development (telephone: [617] 726-2200), with any questions regarding your gift to the MGH.

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Cover:
A psoriasis patient undergoes PUVA treatment
in an ultraviolet-A
light chamber. See p. 24.

2
Francis H. Burr, Esq.
5
J. Robert Buchanan, M.D.
8
Breaking ground for the Wellman Research Building
8
Institute of Health Professions
8
The Ambulatory Care Center opens
9
Opening of Cabot Day Surgery Floor
10
New units
The Eating Disorders Clinic
Chlamydia trachomatis–a new V.D. problem
Music medicine
16
The cancer war
Intraoperative boost radiation
Proton-beam radiation
New melanoma procedure
Testing fetal tissue
18
Younger patients
Burns prevention
Smallest kidney transplant
Psychiatry for very young children
Precocious puberty
22
Vasopressin–the hormone of memory and learning?
24
Limb replantation
24
Psoriasis treatment approved
25
Using the hepatitis-B vaccine
26
Digoxin and the third heart sound
28
New skin
29
The NMR breakthrough
30
Harvard Medical School's 200th anniversary
30
Thanks to Joseph B. Martin, M.D., Ph.D.
30
In memory
Benjamin Castleman, M.D.
Miroslawa Jasinska, M.D.
Myron B. Laver, M.D.
32
Financial Statements
33
Facts and Figures
33
The Patient's Dollar
34
The Massachusetts General Hospital
Members of the Corporation
The General Hospital Corporation
  Administration
  Chiefs of Service and Departments
36
Ways of Giving

From the Chairman of the Board

During the first part of 1982, the MGH remained under the capable leadership of my predecessor as Chairman, Dr. F. Sargent Cheever, and the Acting General Director, Dr. Joseph B. Martin. The Search Committee for the new General Director, with the incalculable help of many capable persons in the MGH family, was fortunate in being able to recruit Dr. J. Robert Buchanan who joined us as the General Director on July 1, 1982.

Dr. Buchanan, an endocrinologist, is a 1954 graduate of Cornell University Medical School and was a resident at New York Hospital. He served with the United States Army as Chief of Medicine of the 121st Evacuation Hospital in Korea. After military service, Dr. Buchanan returned to Cornell as a teacher and as Administrator of the Ambulatory Care Program and became Dean of the Medical School in 1969. In 1977 he moved to Chicago to become the President of the Michael Reese Hospital, a major teaching and tertiary-care facility of approximately the same size as the MGH.

Dr. Buchanan has already demonstrated in many ways the value of his broad experience and his unusual capabilites in dealing with what promises to be one of the most difficult periods of our history.

It is abundantly clear today that hospitals are sailing into troubled waters. Unparalleled inflation followed by a severe recession, high unemployment, and enormous federal deficits have quite logically caused great concern with respect to all forms of expenditures, both public and private. The escalating costs of health care, which are now nearly 10% of the gross national product, have provoked many cost-saving measures by the federal, state, and local governments. Accordingly we have the phenomenon of massive and stringent regulations at a time when deregulation is the fashionable mode for many previously closely regulated segments of the economy.

Yet the MGH continues to forge ahead in spite of these enormous financial constraints. In this report you will read that the Ambulatory Care Center has opened, that ground has been broken for the Wellman Research Building, that graduate students are now enrolled in the MGH Institute of Health Professions. These are all positive results of the hospital's $114 million Capital Campaign, launched in 1981 to regenerate our inpatient, outpatient, and research facilities and provide endowment for the Institute. By raising the money needed for these improvements, the MGH will not be forced to borrow capital funds at high interest rates. Thus the Campaign reflects our commitment to curtailing costs while providing the finest possible accommodations for our patients.

You will also read of amazing cures, of extraordinary developments in medical research, of discoveries that seem to offer realistic prospects of life not quite eternal but at least much increased over what we now accept as a fair human span of years.

We can catch a glimpse of a future in which we regenerate a human kidney or even a lung or heart from a simple cell culture from the patient.

Mr. Francis H. Burr, Esq. (left), Chairman of the Board of Trustees, and Dr. J. Robert Buchanan, General Director, at main entrance of the new Ambulatory Care Center

"Enormous amounts of free care"

We can foresee a time in which diagnostic technology presents the physician, the scientist, the teacher, and the student with a living, breathing, three dimensional, transparent image of the patient's body as a whole or in any small part viewed in any cross-section, at any level down to the subatomic. We can foresee a time when medicine will be able to rebuild the skin, the bones, the organs, the processes of the very genetic code. Reflect on where we were a mere century and a half ago when there was no anesthesia or antisepsis. Our concern at the MGH is that these dynamic and exciting developments will not receive the financial support which will enable them to be brought to fruition.

Our further concern is that we will be stifled and constrained by an inflexible universally applied straitjacket of reimbursement formulas which will not differentiate between the tertiary-care hospital and the community hospital, allow for the enormous amounts of free care and emergency service given by the large metropolitan hospital, or give adequate encouragement to the institutions that educate the physicians and other health care technicians of the future.

We recognize that it is our duty to pare costs to the bone and to eliminate all frills and unnecessary expenditures, and we shall do our best to that end, but we will also do our level best to preserve and maintain the high quality of our services, and to provide a productive and creative environment for all those who work in the hospital.

Francis H Burr

Francis H. Burr, Esq.

From the General Director

I arrived at the MGH last year at about the same time as the implementation of Chapter 372 of the General Laws of the Commonwealth of Massachusetts, the new law aimed at containing the cost of health care.

Chapter 372 is a sign of the times. The particular task that I face as a member of the MGH community can be summed up in terms of that law and its positive and negative aspects.

Chapter 372 was enacted as the result of concerted effort mounted mainly by insurance companies, business groups, and state government to break medical costs out of their long-term upward spiral. The inflationary condition of the American economy as a whole over the past decade and a half is one basic cause of these high costs, but on top of this are imposed other causes that made the situation even worse.

First, the earnings of nonphysicians in the medical professions had long been disproportionately low. The 1960s and the 1970s were a time in which this imbalance was largely corrected.

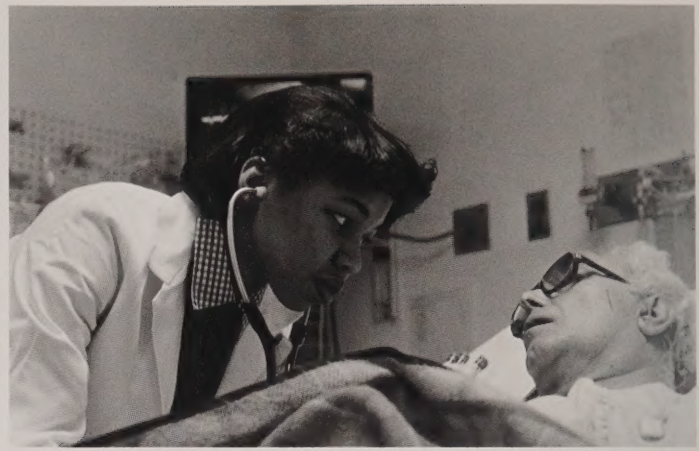
Second, new technologies in diagnosis and treatment derived from new scientific advances were intrinsically expensive beyond anything medicine had ever before confronted. Medicine is often chastised these days, to be sure, for taking too fondly to technology; but the fact remains that the new advances are welcomed and expected–indeed, in some respects demanded–by the society as a whole, for the simple and sound reason that they benefit so greatly the health of the entire human community.

Third, a major source of health-cost inflation is the fact that third-party payment systems such as Medicare and Medicaid largely insulated both patients and physicians from the acceleration of costs we have seen over the past 20 years. With Medicare and Medicaid, the financial aspect of health care seemed to have disappeared from the doctor-patient relationship. In fact, it had merely been disguised. The reality behind "free" medical service was that in 1981, for example (the most recent figures), we Americans spent a total of $247 billion on our health–an amount greater than the defense budget and equal to almost 10 percent of the gross national product. As the government continues its curtailment of public support of personal health care, this reality is forced out of hiding, and we all have to face it.

The meaning of Chapter 372 is therefore plain. Health-care institutions must operate more cost effectively and find alternative means of support for capital expenses. If they do not, the quality and availability of health in America will inevitably suffer.

We are necessarily somewhat limited in our options. The MGH has been paring costs for several years running now. It is hard to tighten budgets that have already been tightened and retightened repeatedly. At the strategic level, so to speak, we can try to restructure health care itself to make it less expensive and more accessible despite pressures on costs. A perfect example of this is the Cabot Day Surgery Floor in our newly opened Ambulatory Care Center. Made possible by a $1 million

In 1981, Americans spent $247 billion on health care.



gift from the Cabot Family Charitable Trust, this suite of ten operating rooms on the third floor of the A.C.C. allows the performance on an outpatient basis of many surgical procedures that once required hospitalization. Thus, the Cabot floor potentially increases our available beds without increasing their number. And, it also means reduced costs of services to patients treated there.

Not only is the Cabot floor a means of reducing costs but the Ambulatory Care Center itself is also cost effective by centralizing care for all outpatients and improving the efficiency of operations for both the medical staff and the patients.

Besides looking for more economies ourselves, we must also continue to oppose excessive governmental regulation of hospitals–regulation which, however well motivated, significantly increases the cost of medical services even during times of comparative prosperity, and which harder times such as the present make all the more unfair to patients and burdensome to the hospital.

The MGH is not blindly opposed to all forms of public regulation. Titles 18 and 19 became effective in 1966 and clearly improved the state of the nation's health. For that matter, the general *aim* of Chapter 372–i.e. to contain the rise of health costs in the Commonwealth–is praiseworthy. But some of the methods by which Chapter 372 proposes to achieve this aim will, we believe, prove counterproductive.

For example, it is our neediest patients, the poor and the elderly, who are hardest hit by new governmental regulations that impose caps on certain procedures, limit the number of patient care days, and force hospitals to bear a greater share of the costs of "free care and bad debt" services. If this pressure does not abate, a great many medical institutions may find themselves struggling for survival and therefore shopping for radical economies.

Meanwhile, we have seen the second year of our campaign to raise $114 million–funds needed to complete financing of the Ambulatory Care Center, to upgrade our inpatient facilities, to complete payment for the Cox Center for Cancer Management, and to establish our new graduate school, the MGH Institute of Health Professions.

Thanks to the generosity of Arthur O. and Gullan M. Wellman of Florida, the MGH has already raised $15 million for another part of The Capital Campaign, a new research building. And friends of the hospital know that many, many contributions are needed to reach the interim goal of $65 million to be raised by the end of fiscal 1983.

The MGH is a flagship of contemporary medicine and the living embodiment of a tradition of excellence in healing, science, and teaching, a tradition which is in itself a public treasure and which must be protected and nurtured from one generation to the next. The social responsibility of any MGH leadership is to keep this tradition vigorous; that of the current leadership is to keep it vigorous in a time of great stress and uncertainty.

Robert Buchanan.

J. Robert Buchanan, M.D.

Members of the first class of the MGH's new Graduate Program in Nursing

Breaking ground for the Wellman

The MGH broke ground in April of 1982 for construction of the Wellman Research Building, a critical new addition to our basic complex, made possible by the remarkable generosity of Arthur O. and Gullan M. Wellman, who contributed $15 million to the project.

The Wellman building will house the research activities of a wide array of medical disciplines, each selected because it represents a specialization likely to produce major advances. At present, these are photobiology; cellular and molecular biology; metabolism, endocrinology, and nutrition; the neurosciences; aging, growth, and development; and technology assessment.

More than 300 scientists and engineers are engaged in research and development work in some 75 MGH laboratories, producing a stream of knowledge that makes the MGH a major tributary to health care around the world. The new Wellman facility will bring many of these activities under a single roof, creating the interdisciplinary atmosphere that experience has shown to be so conducive to scientific creativity.

Institute of Health Professions

The Graduate Program in Nursing of the MGH Institute of Health Professions admitted its first class of 31 students in September. The three-year program leads to a Master of Science degree in nursing and is designed specifically for nonnurse college graduates. It is one of only four in the nation that grant graduate degrees in nursing to nonnurse baccalaureates.

The Institute of Health Professions is the academic unit of the MGH. Established in 1980 on the hospital campus, the Institute's aim is to prepare clinical specialists in a variety of health professions.

By the end of its first five years of operation, the Institute expects to have an enrollment of about 250 students and admit 50 students each year to the nursing program.

The MGH Institute also offers master's degree programs in physical therapy, dietetics for licensed professionals, and a combined internship and master's degree in dietetics. In addition, the Institute offers a one-year course leading to a Certificate of Graduate Study in Social Work in Health Care. Like the nursing program, the social work course is designed for college graduates without a social work background.

Plans for another graduate level program, one leading to an M.S. in speech-language pathology, are on the drawing board, along with two programs that would lead to B.S. degrees in respiratory therapy and radiologic technology.

"In education of health professionals," says the provost of the Institute, Julian F. Haynes, Ph.D., "I don't think there is anything else in the country which has the breadth of what we are doing here."

Grand opening–our new Ambulatory Care Center

The opening this year of our new Ambulatory Care Center brought to fruition our most substantial building project since construction of the Cox Cancer Center in 1974. The new A.C.C. replaces facilities built 80 years ago to treat 300 patients a day. By 1980, the 300 had become 1,400, and it was clear that the new building was coming on line not a moment too soon. The nine-story, $32 million facility, partially financed by our current general fund-raising campaign, will ultimately provide some 600,000 outpatients a year with single-point access to the MGH's many clinics and special units.

Drs. Paul S. Russell and John A. Parrish review blueprints for the Wellman Research Building.

Opening of Cabot Day Surgery Floor

"Day surgery" is so called, of course, because it does not keep the patient at the hospital overnight. After certain surgical procedures, a healthy patient is quite safe in leaving the hospital within three to four hours, even after general anesthesia.

Day surgery thus radically reduces the costs of performing certain procedures. It lessens the emotional trauma of surgery.

The MGH has been building this capability since 1970 when it opened its first ambulatory surgery room. Within three years the unit had moved into a seven-operating-room suite.

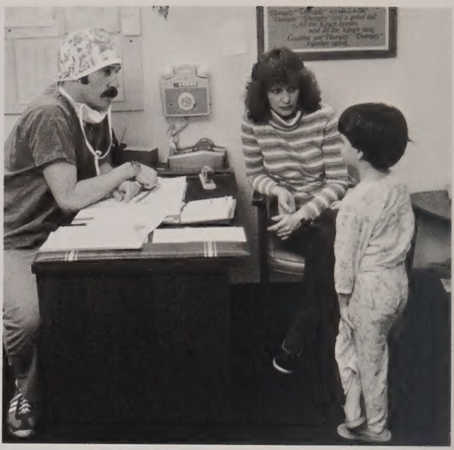
And on September 10, 1982, the hospital dedicated the Cabot Day Surgery Floor, a unit of 10 operating rooms within the new Ambulatory Care Center. The floor is named in honor of a family that has long been close to the hospital. Thomas D. Cabot of Weston is a life member of the MGH Corporation. A $1 million donation from the Cabot Family Charitable Trust helped make the new day-surgery facility a reality.

Seven of the new operating suites are for adult surgery, one for pediatric, and two for endoscopy, an internal visual examination technique that uses fiberoptic lighting. It is generally performed diagnostically, but endoscopy also allows physicians to remove certain tumors and polyps.

The Cabot Floor was especially set up to make things easier for children. The pediatric suite is decorated with brightly painted murals of storybook characters. There is an area for parents and children to play in before the child is prepared for

Topping off the Wellman Research Building

Julie Dell'Orfano, R.N., checks patient Anthony Provanzano, Jr., into the new Cabot Day Surgery Floor, a portion of which is specifically designed to make surgery easier for children.



Above: Young Anthony meets his anesthesiologist, Dr. Timothy J. Quill, who explains the next step to patient and parents.

surgery. Parents hold and comfort their children while they receive anesthesia. Parents and children are reunited within the unit as soon as the anesthesia has worn off. "We do everything we can to make surgery as easy as possible for the children," says Elizabeth Gomes, R.N., Administrative Supervisor for the day-surgery unit. "We try to keep separation from parents at a minimum."

The cost of the day-surgery suites is about half that of the hospital's main operating rooms.

New Units

The hospital opened an eating disorders clinic and a laboratory to study the latest venereal threat. It also developed an unexpected flare for the medicine of playing the piano.

The MGH Eating Disorders Clinic

As a group of individuals, they present a general impression of healthy well-being. They are typically intelligent, lively, successful, attractive young middle-class women from educated homes, and even their closest friends may not know that several times a day they compulsively gorge themselves, experience intense guilt after each episode, purge by inducing vomiting or abusing laxatives, and become more depressed by wondering if this strange eating habit is a sign of insanity.

"It is not," says Dr. David B. Herzog of the MGH Psychiatry Service's Eating Disorders Clinic. "There is a reason for their particular behavior. During treatment, patients have the opportunity to become aware of the rationale behind their conduct." In fact, the most surprising aspect of bulimia or the "binge-purge syndrome" is how widely the disorder is spread among people who are quite sane, normal, and accomplished in all other respects. Some medical investigators are now reporting that as many as one out of five women at American colleges may be afflicted to some degree. And another two percent suffer from anorexia nervosa, more familiar perhaps because the emaciation it leads to cannot be so easily concealed.

What precipitates bulimia? It occurs most often in obsessive, perfectionistic, middle-class people facing a period of stress—a death in the family, a separation from a spouse or a friend, a difficult career decision—where the stress is most often characterized by an intense ambivalence toward a choice that presses to be made.

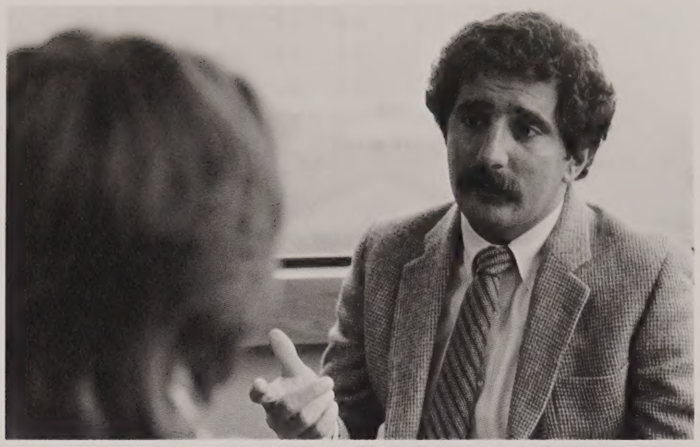
The frustration of the bulimia victim can be nerve-shattering. "None of these people can really enjoy a meal," says Dr. Herzog, "because, fully aware of what they are doing, they worry about body image. Depression almost always sets in during or after each binge."

Dr. Patricia K. Donahoe, pediatric surgeon, tells the parents that the operation went well and gives them postoperative instructions.

Being shown where he will go with his parents to be examined and to be administered the anesthetic

After receiving anesthetic, child falls asleep in the arms of his parents.

Ready to go home



Dr. David B. Herzog, Director of the new Eating Disorders Clinic

The sense of shame that attacks the bulimic person is one of its most destructive effects because this shame keeps the sufferer from asking for help. Even among those who present themselves at the clinic, many find it hard to be wholly candid about their problem. Givers of care must therefore move cautiously. "We can't impose our services," says Dr. Herzog. "We have to be flexible, determining first what the patient can tolerate."

But this all-too-human reluctance to be forthcoming is apparently changing as public awareness of the disorder dawns, and bulimia's many victims come to see that they are not alone.

The MGH Eating Disorders Clinic is supported in part through a three-year $50,000 grant in memory of the late Abigail Adams Atchley. The visit day is Thursday. An evaluation takes several hours and may include a range of consultations from psychological testing to physical examinations, depending on the patient's needs and willingness to cooperate.

Chlamydia trachomatis—a new V.D. problem

A recent study to determine the prevalence of sexually transmitted conditions among several hundred women at a large American university found that only four-tenths of one percent had gonorrhea, but that ten times that number had a venereal infection caused by another microorganism known as Chlamydia trachomatis.

This underscored a major fact.

Not exactly a household word, chlamydia is nevertheless the cause of the infection of the genitals, lungs, and eyes of well over two million Americans a year, including 150,000 babies infected in the birth canal. Thus, however unfamiliar its name, chlamydial infection has emerged as a nationwide health problem of epidemic proportions.

This is why in 1982 the MGH Infectious Disease Unit opened a special laboratory devoted to the diagnosis and treatment of chlamydial disease. "More and more diseases of the male and female genitourinary systems are being recognized as caused by chlamydial infections," says Dr. Martin S. Hirsch, director of the new Chlamydia Laboratory and Associate Professor of Medicine at Harvard Medical School. "The Chlamydia Laboratory is one of a relatively few around the country, but the number is increasing as the chlamydia organisms become better known, and their significance becomes more apparent."

Chlamydia affects men as an inflammation of the urethra. The leading symptom, a burning discomfort during urination, appears a few weeks after exposure. In women, the infection may initially inflame the cervix, then progress to the fallopian tubes. It takes longer to emerge in women than in men and can be missed in women altogether. Known as salpingitis, this condition can ultimately lead to infertility.

The disease is not terribly hard to treat. It responds well both to tetracycline and erythromycin. The biggest problem lies in identifying it. It often appears along with a gonococcal infection which symptomatically masks the chlamydia, so that physicians prescribe medication against only one of the ailments, not realizing that they are facing two different diseases.

Music medicine

Pianists are artists, and artists make their art seem effortless, but the fact remains that the concert performer's regimen is always physically demanding, often punishing, and sometimes crippling.

Consider that the concert pianist's career of music lessons and intense practice generally begins early in life and continues long, spanning 30–50 years of concert-filled seasons and day after day of eight-hour practice sessions.

No wonder then that so many professional pianists develop problems with their hands. They tend to take these problems as a matter of course and to adjust to them until they can no longer do so. Then they must

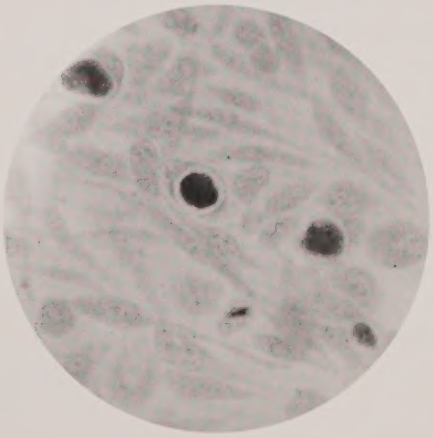
Teresa R. Rota (left) and Sarabelle Madoff Annenberg of the Chlamydia Laboratory

seek help from a medical community which, in general, has found their problems difficult to diagnose and treat and which has therefore tended to regard them as psychosomatic.

Medical understanding of the pianist's hand was limited until recently to works culminating in the monograph of Otto Ortmann, *The Physiological Mechanics of Piano Technique,* published almost 50 years ago.

But for the past two years, three MGH physicians, Drs. Fred H. Hochberg, Robert D. Leffert, and Bhagwan T. Shahani, have been working as a team to acquire understanding of the physical difficulties pianists face and to provide treatment for them.

"The complaints of our patients are somewhat sophisticated," says Dr. Leffert, an orthopedic surgeon and Chief of Rehabilitation Medicine at the MGH who also teaches at Harvard Medical School. "This is because the functional needs of these patients are highly specialized." Having treated more than 150 musicians for occupationally related complaints and corresponded with another 75–100, the doctors have sometimes found it difficult to translate the complaints into medical terms. Dr. Hochberg, a neurologist and an academic colleague of Dr. Leffert's at Harvard, says, "Most often we are asked to obtain musical histories to define medical complaints."



The Chlamydia trachomatis microorganism affects the health of over two million Americans a year.

Typically a patient might complain: "My teacher says I'm having difficulty with arpeggios in my new pieces," or "I once could play an octave passage in Brahms which I now cannot play."

The musician is inclined to shoulder the blame for physical problems —to attribute them to a lack of practice, to incorrect technique, or to the complexity of a particular composition.

In fact, the MGH experience so far indicates that such diagnoses are rarely accurate. Drs. Hochberg, Leffert, and Shahani are not seeing neurotics. They are seeing, rather, people with occupational problems.

Take the case that opened up the whole issue, that of pianist Gary Graffman, a winner of the prestigious Leventritt award and a leading American musician. For two and a half years, he had lived with a hand problem that a series of doctors had been unable to diagnose or treat. Then through a friend Mr. Graffman came to the attention of Dr. Hochberg, whose first step was to carry out electrodiagnostic studies to rule out the common causes of hand problems. When these studies showed no damage to nerve or muscle function, the next step was to videotape Mr. Graffman at the piano. Says Dr. Leffert, "The videotape helped us immensely. It allowed us to go back and watch the pianist's position and his hand and arm movements. It made it easier for us to begin separating the problems."

Drs. Leffert and Hochberg originally assumed that Mr. Graffman's was an isolated problem.

But shortly after Mr. Graffman came to the MGH, two things occurred. First, Doubleday published Mr. Graffman's memoir, *I Really Should Be Practicing,* reviews of which invariably told of his treatment at the MGH. And second, Mr. Graffman persuaded his friend, fellow pianist and fellow sufferer, Leon Fleisher, to visit his MGH doctors.

Leon Fleisher was generally regarded as the world's leading "young" pianist when, at the age of 37, he lost the use of the fourth and fifth fingers of his right hand to a mysterious disorder. That was in 1965. Over the next several years, a variety of medical approaches—including psychiatric ones—failed to solve or even to explain his physical problem. Mr. Fleisher was forced to remake his musical career. He won new recognition as a conductor and a teacher, but the restriction of his concert repertoire to works for the left hand alone left him without the substance a serious musician needs. It was thus 15 years after the apparent end of his performing career that Mr. Fleisher came to the MGH group that had begun by treating his friend, Mr. Graffman.

Mr. Fleisher's problem was partly diagnosed as a carpal-tunnel syndrome, a form of peripheral nerve entrapment. In January 1981, Dr. Leffert's surgery freed up the tendons and median nerve and opened the way into a taxing recovery period in which Mr. Fleisher used myotherapy and biofeedback techniques to regain use of the hand.

The happy denouement came when Mr. Fleisher performed Cesar Franck's "Symphonic Variations" with the Baltimore Symphony Orchestra at the gala opening of the orchestra's new concert hall on September 16, 1982—17 years after his ordeal had begun.

As a result of the publicity generated by the Graffman and Fleisher treatments, the MGH group was deluged by worldwide inquiries from musicians who had similar hand problems and who only now realized they were not alone. "At this point," said Dr. Hochberg, "it became apparent that we were dealing with an epidemic."

Of the more than 150 musician patients the MGH team has seen for intractable hand maladies in the two years since then, over four-fifths have been pianists. (The team has also treated cellists, violinists, harpists, and violists.) Three-fourths of the pianists have had tendinitis, and the vast majority of them were afflicted in the right hand, probably because this hand carrries the greater burden.

The doctors thus began to look for the origin of piano hand problems in keyboard technique. They found that most of their patients were trained in the Russian school, which emphasizes strong individual finger movements. Indeed, these pianists tended to call themselves "steel-fingered" and to play concert pieces by such composers as Rachmaninoff, Liszt, and Brahms – technically demanding music that requires great strength and speed.

Pianists themselves might somewhat ease their own pain by learning more about the structure of the hand. As Dr. Leffert observes, "Virtually no musical training program includes any consideration of the anatomy of the pianists' instruments, their hands. They know about the piano, but they do not know about their hands, arms, and shoulders and about the requirements for muscular activity and performance."

Beyond this, the MGH doctors believe that progress in this area requires a more precise means of documenting the player-patient's individual performance. For this purpose, they are hoping to have facilities donated for computer analysis of movement (a Selspot apparatus). As for their progress to date, Dr. Hochberg says, "If nothing else, we have removed some of the myths shrouding the hand difficulties of

Leon Fleisher performing in September 1982 at the opening of Baltimore's new symphony hall. Mr. Fleisher's career had been interrupted for 17 years by a mysterious disorder of his right hand.

pianists. The stigma that used to be attached to these misdiagnosed physical diseases is beginning to disappear."

The cancer war

The MGH Cox Center for Cancer Management, established in 1977, is now treating about 18,000 patients a year. Its physician scientists continue to help create new approaches to the fight against cancer. Among the research developments the center reported in 1982, the following are especially notable:

Intraoperative boost radiation
A basic problem of radiation therapy is how to give a patient enough radiation to affect the tumor without causing major complications to the healthy tissues around it. One technique, called intraoperative radiation therapy, irradiates the tumor directly while it is surgically exposed. This technique was developed in Japan and first performed in the United States at Howard University. The wrinkle added by MGH doctors was to combine this method with conventional X-ray therapy to destroy cancer cells that have traveled beyond the visible tumor. For patients with locally advanced cancer of the colon-rectal region (colorectal), for example, the five- to six-week course of radiation treatments delivered before surgery is also designed to shrink the tumor so that a surgeon will have a better chance of removing it. After a rest of three to five weeks, the patient receives intraoperative irradiation directly to the area where the cancer is most likely to recur.

"The combination really makes a lot of sense," says Dr. Joel E. Tepper, head of the MGH program, "because the conventional irradiation can control the small tumor extension while the intraoperative irradiation can be used where it is needed most—that area where the tumor is concentrated."

Proton-beam radiation
Cancers arising near the spinal cord are nearly impossible to treat with surgery or conventional X-ray therapy. The failure rate of traditional treatment approaches 100 percent.

But doctors at the MGH have been able to destroy cancers around the spinal cord without harming nervous system tissues, and they have done it by use of proton-beam radiation generated by a cyclotron. Beams of positively charged particles from the center of the hydrogen atom destroyed the tumors of all 10 patients in the study. Nine are alive today, ten months to six years after treatment, with no sign of recurrence.

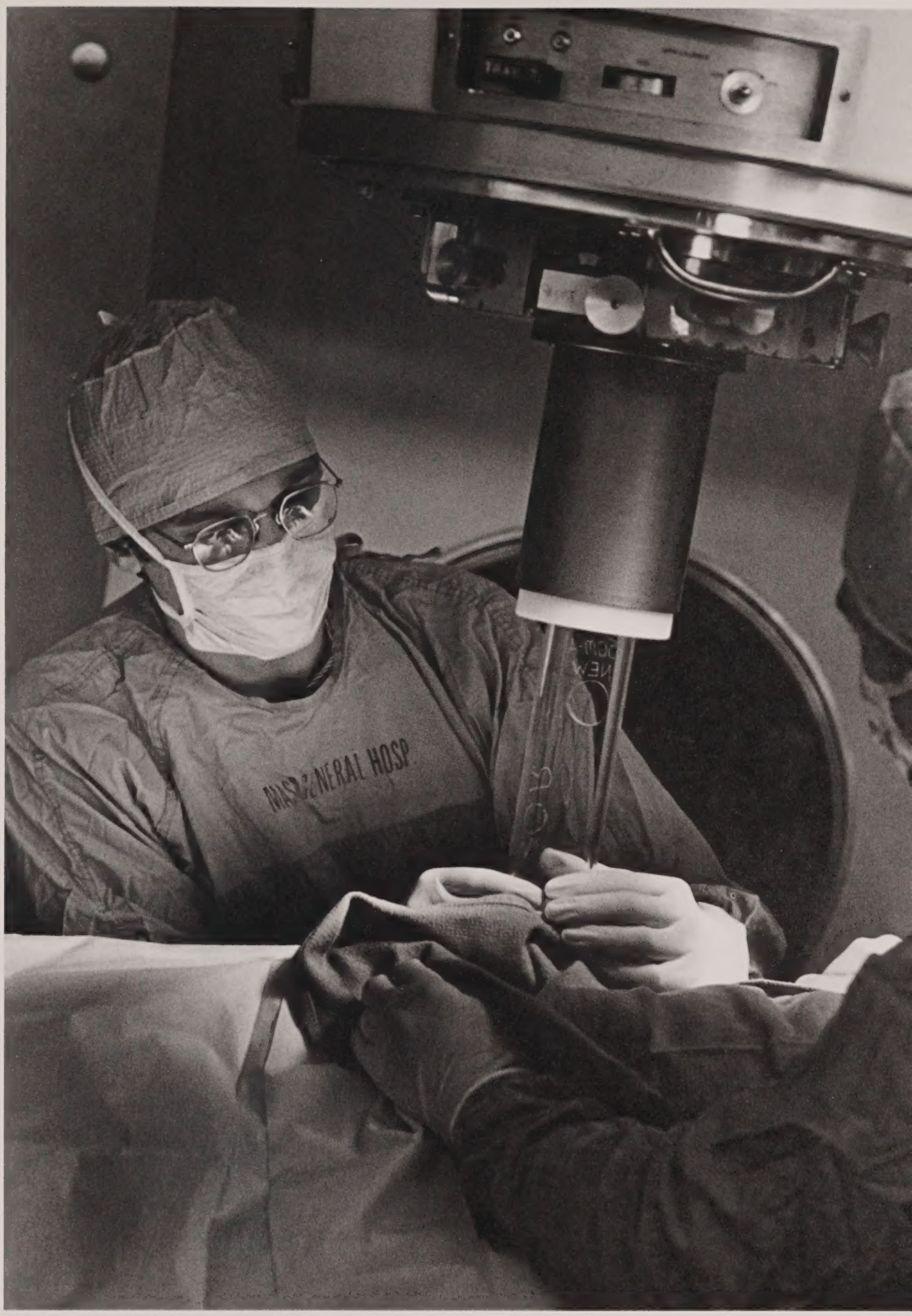
New melanoma procedure
For the past 30 or 40 years, surgeons have treated malignant melanoma by removing the tumor and all the skin within two inches of it, which left

CT-scanner images of a patient's tumor are used in planning proton-beam radiation therapy.

the patient with a large defect. But now an MGH surgical team led by Dr. Ronald A. Malt claims good results with much smaller surgical margins. This is because the disease is now being diagnosed much earlier then before, and because new analytical methods allow physicians to determine which tumors are likely to spread.

Testing fetal tissue
Scientists from the MGH and the University of Colorado Medical School have developed a technique for grafting fetal tissue into a mouse host that allows for directly testing how the hormone called DES (diethylstilbestrol) affects the developing human female reproductive tract. The technique also holds promise of allowing researchers to examine fetuses for the effects of other drugs that are administered during pregnancy.

DES, a drug prescribed widely in the 1940s through 1960s to prevent miscarriage, has been shown by MGH investigators to cause vaginal or cervical cancer in one out of approximately 6,000 women exposed to the drug before birth. DES-exposed women also have high rates of vaginal adenosis (the presence of glandular tissue in the vagina), higher rates of miscarriage than unexposed women, and structural abnormalities of the uterus and fallopian tubes.



Dr. Joel E. Tepper sets up the field for intraoperative radiation therapy.

Dr. Ann B. Barnes is one of the key designers of the MGH DES project.

The discovery of the effect of DES has given rise to new investigations into the mechanisms of human genital tract development. Although rodents and nonhuman primates are commonly used to test for drug-induced birth defects, important differences exist between the development of their reproductive tracts and that of humans. For example, the human genital tract develops prenatally, while the reproductive system in rodents is not completely formed until after birth. In addition, clear-cell adenocarcinoma, the only type of cancer linked so far to prenatal DES exposure in humans, has never developed in mice exposed to the drug.

Says Dr. Stanley J. Robboy, MGH pathologist and Associate Professor of Pathology at Harvard Medical School: "This led to the development of the present technique which, as far as I know, is a totally novel approach—the use of human fetal tissue grown in vivo in an animal to study human disease. Outside of this technique, there is no known mechanism for supporting outside the womb the growth of human fetal organs and for actually watching them differentiate." The pathologist believes that this technique may ultimately provide "an entirely new way to test drugs before they are given to women."

Younger patients

All hospitals have a special feeling for their younger patients because all grown-ups have a special feeling for children. Work at the MGH this year especially affected children in four areas—burn prevention, infant kidney transplant, psychiatry for preschoolers, and treatment of precocious puberty.

The burns project: an exercise in prevention

"A burn destroying the full thickness of the skin over a wide area of the body is the worst injury that a person can suffer," says Dr. John D. Crawford, head of the Endocrine-Metabolic Unit in the MGH Children's Service and Chief of Pediatrics at the Shriners Burns Institute, an MGH affiliate.

"If a person suffered a heart attack or stroke, or were hit by a truck, a physician generally could tell the patient's family in a week or 10 days whether the crisis had passed. But for severely burned children here at Shriners it might take not 10 days but 100 days before we could say, 'He's going to make it.' "

And burn statistics are staggering. Two million Americans suffer serious burns a year, more than 70,000 require hospitalization, and 9,000, a third of them under the age of 15, die from their injuries.

For the past several years, Dr. Crawford has served as Principal Investigator of Project Burn Prevention, a federally supported program which has embraced the MGH, Shriners, the Education Development Center in Cambridge, Mass., the Harvard School of Public Health, and the National Fire Protection Association. Together, these centers have studied how, where, and to whom burn injuries most often occur and what can be done to lessen the danger.

The study has found that for burns of children around the age of two, the odds are better than nine out of ten that hot liquid is involved. Says Dr. Crawford, "Children at that age pull at everything they can. If it's a tablecloth, a cup filled with hot coffee could come tumbling down."

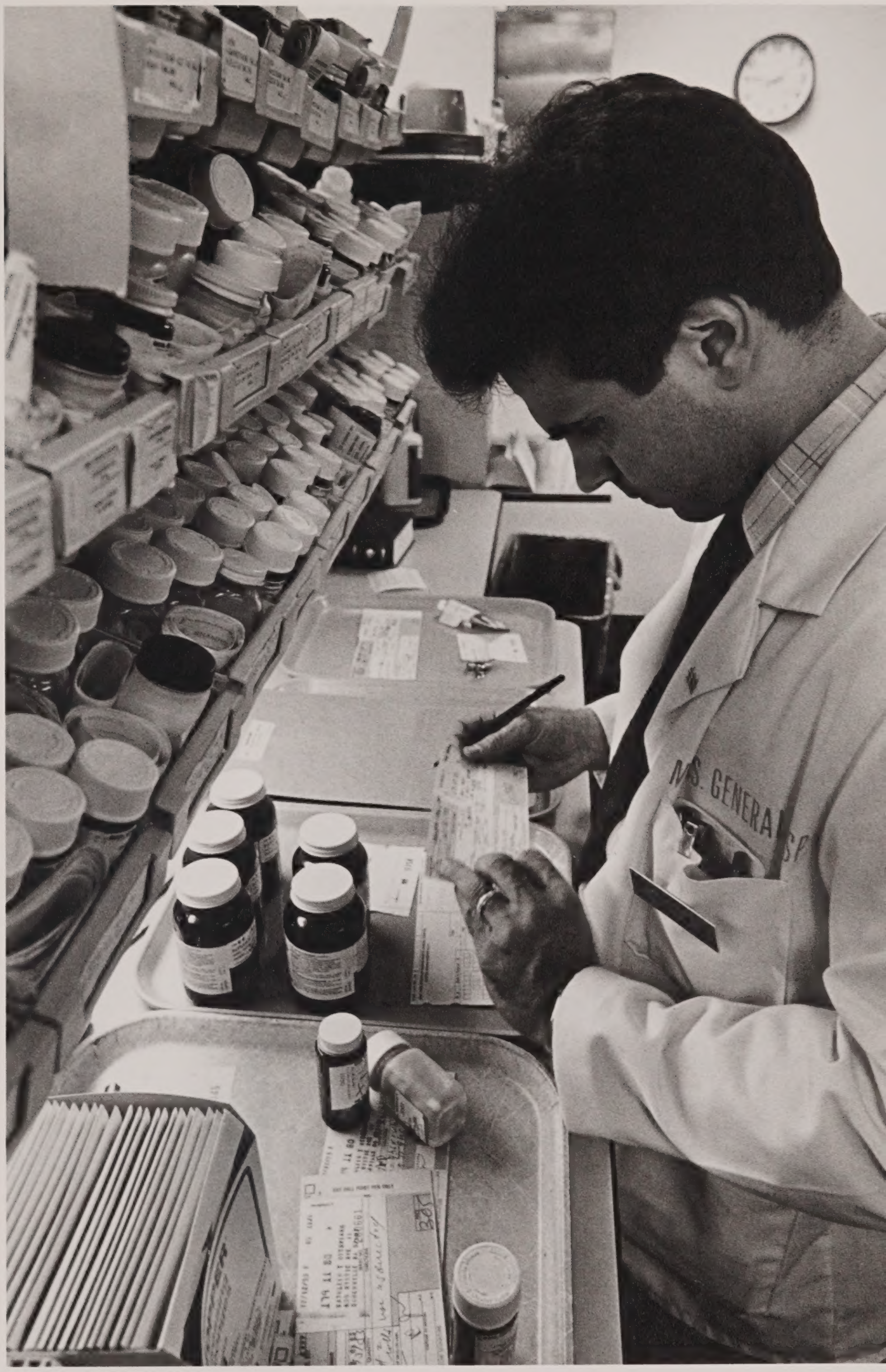
Dr. Crawford, Professor of Pediatrics at Harvard Medical School, also cautions that youngsters of two and under put everything into their mouths, and there is probably nothing more dangerous than the far end of an electric cord that is still connected to an outlet.

At between five and seven, most children go through an imitative phase in which they may become fascinated by forbidden acts, such as lighting matches. To avoid being caught, they play with the matches where they will not be seen, in closets and bedrooms. "Every child of that age should be taught how to use matches," Dr. Crawford said. "A positive approach rather than a rigid ban would make playing with matches less dangerous and less of a temptation."

The burn victim in the 12-to-15-year-old range is generally someone who, in the company of his companions and often in response to a dare, has tried to demonstrate his courage by taking a risk of some kind. Such bravado often underlies the mutilating high-tension electrical injuries and causes many motor vehicle accidents. One person in every five killed in a highway crash succumbs from burns.

But most fatal burns occur in house fires, and a large proportion of such fires are traceable to people who were smoking while tired or under the influence of alcohol.

In Dr. Crawford's view, the advent of the smoke detector may cause the biggest reduction in fire deaths since the early 1900s when electric lighting replaced the gas light. The National Fire Protection Association describes the detectors—many cost less than $10—as a family's first line of defense against a fire. In 1975, fewer than five percent of homes had a smoke detector, whereas today the figure is 60 percent, a heartening improvement.



A new way has been developed to test the safety of drugs before they are given to women.

And Dr. Crawford also sees progress in prevention through continued study of the hows and whys of burns. "Unlike accidents which are totally unpredictable, having no rhyme or reason, burns often correlate with factors such as age and sex," he says. "We call that epidemiology. When you have epidemiology, prevention is possible."

Smallest kidney transplant
No child as small as nine and one-half pound Melisssa Saunders had ever lived for more than a year after a kidney transplant. But Melissa's condition was responding neither to medical treatment nor to dialysis and was steadily worsening. Her illness was primary hyperoxaluria, an inherited condition in which an error in metabolism leads to the buildup in the body of a highly insoluble chemical compound, calcium oxalate. Normally, this compound is created in small amounts and washed out by the kidneys, but dialysis does not remove calcium oxalates as well as a healthy kidney, and the chemical continued to accumulate in Melissa's body. Dr. John T. Herrin, Chief of Pediatric Nephrology at the MGH, was especially concerned that if they waited until Melissa was heavier and a better candidate for a kidney transplant, the calcium oxalate would be deposited in her brain and blood vessels.

Melissa's parents, Linda and Daniel Saunders, knew there was an element of risk. "Before we understood what a transplant was," said Mrs. Saunders, "we thought it was too much to put a child through. But as the MGH staff explained what was involved, we were very happy to have this chance." Besides, it was clear that Melissa did not have an alternative. "We felt that giving her the transplant was giving her a chance to live," said Mrs. Saunders. "You have to reach for the stars sometimes," she added.

Dr. Herrin called Mrs. Saunders on the morning of March 25, 1981, to tell her that a kidney was available. Tests of its compatibility with Melissa's system took all day. At 10 p.m., Dr. A. Benedict Cosimi, head of the clinical transplant team, began the operation. It lasted four hours.

"We were lucky," says Dr. Herrin. "She responded rapidly after the transplant. She had a mild rejection episode which reversed readily. Since then, she has done beautifully."

Psychiatry for very young children
Children with psychiatric problems are not generally spotted until they come under a teacher's practiced eye, but the experience of mental health professionals has shown that this is often quite late, and that earlier action would be more effective and less expensive. This is why the MGH Child Psychiatry Service has been devoting increased attention the past three years to children in the infancy-to-five age group. Whether inherited or acquired, problems can be more easily uprooted when they first sprout, and most of them first sprout in the preschool years: problems predominantly with eating, but also with speech and with aspects of the socialization process.

Anne Kane of the federally funded Foster Grandparents Program, in which senior citizens tend children patients whose parents cannot visit regularly

Dr. Muriel Sugarman, MGH child psychiatrist and her colleague, Kristen J. Kuehnle, an MGH psychologist, acknowledge that the testing of preverbal children for mental disorders poses a challenge. But Dr. Sugarman points out that research on

Dr. Muriel Sugarman of the Child Psychiatry Service with a patient. The service is devoting increasing attention to the mental disorders of very young children.

Using an automatic pipette, Harley Heath, Research Assistant in the Neuroendocrine Research Laboratory, draws a precise quantity of spinal fluid for a test to measure the vasopressin content.

infancy has greatly increased our understanding of early development. We can read spontaneous infant behavior almost as though it were verbal communication. As this work continues to advance, says Dr. Sugarman, "it will be possible to intervene earlier to prevent some of the lifelong consequences of emotional disorders in very young children."

Precocious puberty

As many as one child out of 5,000 will begin to mature sexually long before the normal age. The average age of onset of "precocious puberty" is about five years, but it has afflicted a child as young as ten months. It strikes six times as many girls as boys. Its most apparent effect is that the victim's adult height is much reduced. If a girl begins puberty at five years of age, her adult height will probably not exceed five feet.

The disease is of mysterious origin, and there was no satisfactory treatment for it until an MGH research study conceived and directed by Dr. William F. Crowley, Jr., an endocrinologist of the MGH Vincent Research Laboratories, reported that five out of five girls, aged 2 to 7, afflicted with precocious puberty, overcame their condition when treated for eight weeks with a derivative of the hormone that controls the process of puberty.

Puberty in girls begins when the hypothalamus, a part of the brain, sends a chemical messenger called gonadotropin releasing hormone (GnRH) to the pituitary gland, which sits at the base of the brain. The pituitary responds by producing hormones called gonadotropins, which then stimulate the ovaries to produce estrogen. It is the estrogen that directly stimulates the onset of such secondary sexual characteristics as breast development and menstruation. Estrogen also promotes rapid bone growth, making precocious-puberty victims at first very large for their age, but cutting short the overall period of growth, resulting in the loss of adult height.

It is now possible to stop a precocious puberty and then turn the hormonal process back on again at the appropriate time. As Dr. Crowley says, "The ability to control puberty is potentially the ability to control height."

Vasopressin: the hormone of memory and learning?

Memory, the handmaiden of learning, is, like learning itself, a poorly understood phenomenon.

What is the chemistry of consciousness? In physical terms, how do living beings remember and learn? What is the physiological substrate of the life of the mind?

Such questions have been a supreme passion of philosophers since first there was philosophy, but not until the development of scientific means of investigation could argument go beyond speculation. Now there is a broad movement of scientific discovery that is revealing new aspects of the physical manifestations of mental processes.

A number of research groups, for example, including one at the MGH, are studying a brain-produced hormone called vasopressin, long known to be involved in the regulation of body water and blood pressure, but understood in recent years to have another major function. Circulating in the cerebrospinal fluid (CSF) which gives the brain protective buoyance, vasopressin has been shown to affect learning and memory in animals.

Dr. Steven M. Reppert, a pediatrician in the MGH Neuroendocrine Research Laboratory and an assistant professor of pediatrics at Harvard Medical School, advanced the investigation another step when he reported that vasopressin continuously withdrawn from the CSF of experimental animals showed a large daily rhythm and that the highest concentrations occurred during daylight hours, while the same hormone in the bloodstream showed no such pattern. Dr. Reppert suggests that the rhythmic changes of the hormone in spinal fluid further implicate it as a vehicle of communication within the brain and provide new evidence that vasopressin may act through this fluid to influence mental processes, such as memory. Moreover, the fact that vasopressin acts differently in blood

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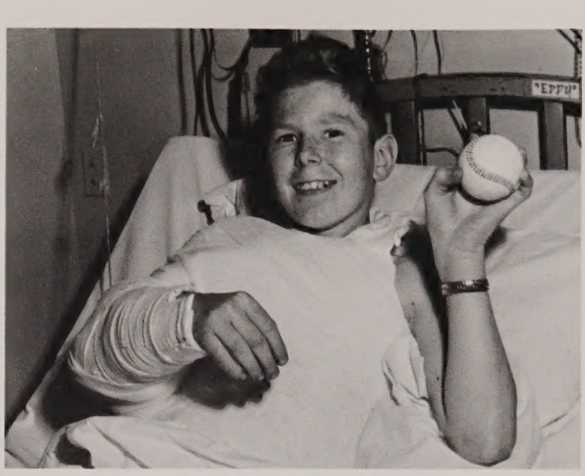
The Brattleboro Rat, a special strain used in MGH studies of the effect on memory and learning of the hormone vasopressin

than in spinal fluid implies that the CSF hormone originates in its own unique site in the hypothalamus, the part of the brain which governs sleep, temperature, hunger, and thirst, as well as such emotions as anger and fear.

"We used to think that vasopressin was made in only two areas of the hypothalamus," says Dr. Reppert, "and that subsequently all of the hormone traveled down certain neuroanatomical pathways to the pituitary gland to be stored until needed in the blood. We now believe that certain hypothalamic neurons [or nerve cells] produce the same hormone to be released and to presumably function within the brain itself."

The impact of vasopressin on learning was demonstrated most dramatically by a team of Dutch scientists working with a special strain of rodent called "the Brattleboro rat" which is genetically incapable of producing vasopressin. This rat demonstrated a marked inability to recall avoidance training (repeatedly making a mistake that a normal rat would only make once). But when vasopressin was injected directly into the Brattleboro rat's spinal fluid, its memory deficit was corrected.

Dr. Reppert cautions that much more work must be done to understand all the ways in which vasopressin affects the brain and thus behavior, but the possibility exists, he adds, that vasopressin may ultimately yield a treatment for certain disorders of learning and memory.



Twelve-year-old Everett Knowles twenty years ago, shortly after MGH surgeons replanted the arm he lost in a train accident

Limb replantation

One processs which was first used successfully to benefit a child observed its 20th anniversary this year.

On May 23, 1962, in a train accident in Somerville, Massachusetts, a red-haired Little League pitcher with a freckled face, 12-year-old Everett Knowles, lost his right arm just below the shoulder. Ninety minutes later he was under the care of an MGH surgical team led by Dr. Ronald A. Malt, then the hospital's Chief Resident in Surgery and now Chief of Gastroenterological Surgery and a member of the Vascular Surgery Unit.

Dr. Malt recalls that he had had no idea at the time that a new field of surgery was being born. "All I was interested in," he says, "was trying to help that boy and not harm him by anything we were doing." He decided to try replanting the arm because an amputation so high on the limb makes use of a prosthesis difficult. "I figured that even if the whole arm did not survive," says Dr. Malt, "if we could even give him a longer stump on the upper arm or give him an elbow, he would be much better off."

But the operation was much more successful than that—the first successful replantation in history of a severed limb. Today, 20 years later, Mr. Knowles is 32. He plays basketball. He bowls. He has handled 200-pound sides of beef at work and can lift a 50-pound weight with the replanted arm alone. And thousands of successful replantations of arms and fingers have been accomplished in hospitals all over the world, with success rates of about 93 percent for fingers and between 65 and 85 percent for arms (depending on where they are severed). And the surgical techniques used by Dr. Malt in replanting Everett Knowles' right arm in 1962 were much the same as those used in another instance in 1982 when Dr. James W. May, Jr., Chief of Hand Surgery in the Plastic Surgical Division, replanted the left hand of Erwin Tarr. The main change is that, today, all the damage is repaired in a single operation—bones, blood vessels, tendons, nerves.

Dr. Malt credits his surgical training at MGH with providing him with the technical and intellectual foundation needed to achieve that first replantation when he was still a resident surgeon. "The surgical residency program," he says, "has traditionally been designed to foster judgment, independence, and technical skills in the trainees and to have these technical skills spread among broad areas of surgery. As a consequence of having had residency in plastic, vascular, orthopedic, and nerve surgery, all of us could envision how a complex injury could be repaired using the crafts of those particular subspecialties."

Says Everett Knowles of Dr. Malt: "If it hadn't been for his having the guts and the know-how, I wouldn't be able to do the things that I love today."

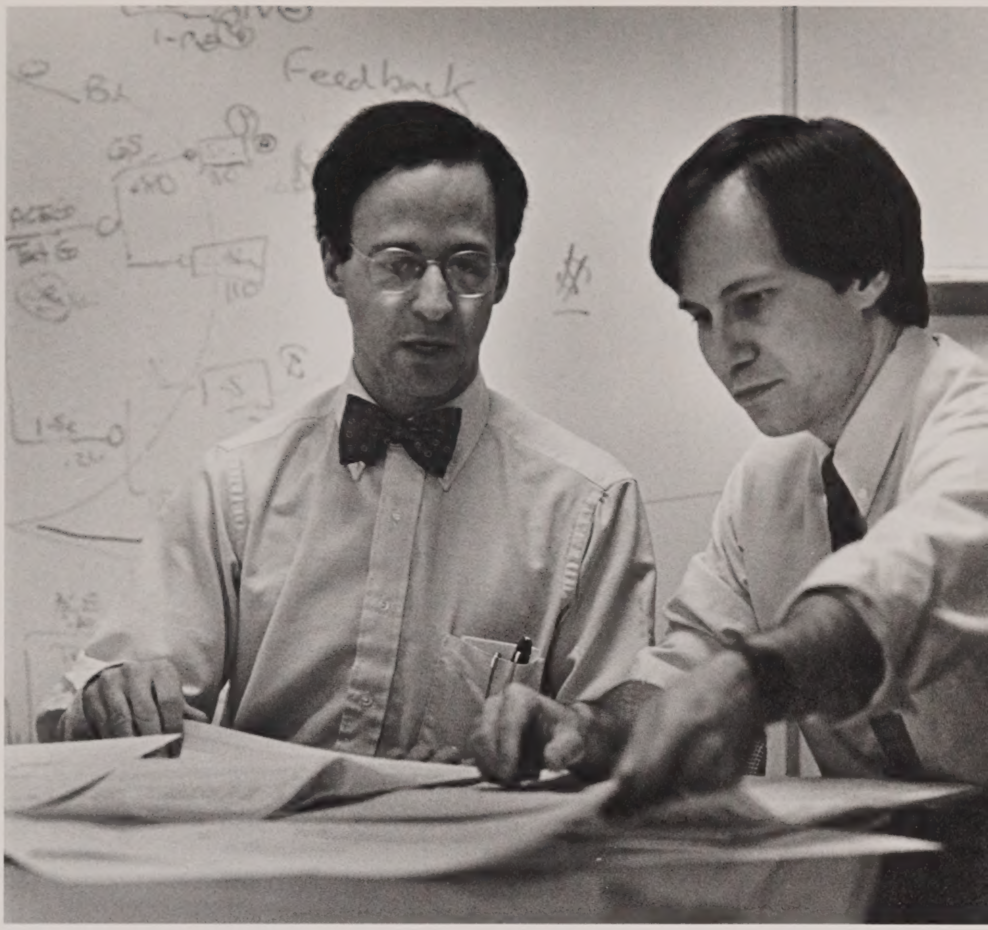
Psoriasis treatment approved

A treatment for psoriasis developed at MGH more than eight years ago has just this fiscal year won the approval of the FDA.

Psoriasis is a chronic scaly patching of the skin that affects approximately two million Americans annually. It is a genetically determined disease that can strike anyone, child or adult, male or female, equally at any time in life. About 300,000 Americans suffer from this often psychologically crippling skin disorder.

And until 1974, when MGH doctors combined an ancient medicinal plant from the Nile with the most advanced ultraviolet technology and thus created the procedure called PUVA, no safe, effective outpatient treatment was available, and inpatient treatments which used topical tars and ultraviolet light and required at least three weeks of hospitalization were thus prohibitively expensive.

PUVA is an acronym for *psoralen,* which is the type of drug used, and *ultraviolet-A,* the light source, the longest wavelength of ultraviolet light. In the PUVA treatment, the patient takes a pill containing the drug psoralen, made from the *Ammi majus* plant, which grows in Egypt along the Nile, and which people in the Middle East have used for thousands of years to treat vitiligo, a skin disease characterized by white spots. The patient waits a few hours for



Drs. Jules L. Dienstag (left) and Albert G. Mulley of the MGH Medical Practices Evaluation Unit reviewing data on use of the new hepatitis-B vaccine.

the drug to take effect—psoralen increases the skin's sensitivity to light—and then enters an enclosed booth equipped with a system of special ultraviolet lights developed through a collaboration of the MGH's Dr. John A. Parrish and engineers at GTE Sylvania. Each PUVA patient must have an individually tailored treatment, owing to individual differences in skin type, in the severity of the psoriasis, and in the number of previous ultraviolet treatments the patient has had. Each session lasts from one to twenty minutes. It takes an average of twenty sessions, spaced over two to three months, to free the patient of the symptoms of the disease.

Although PUVA is a highly effective treatment, it does not cure psoriasis. PUVA requires maintenance treatments to keep the skin free from scaling lesions. Nor is the treatment without risks. For people with certain skin types or who have undergone previous radiant therapy, the PUVA treatment occasions a somewhat higher incidence of mild, readily cured skin cancer. Patients requiring many treatments may experience premature aging of the skin. MGH dermatologists recommend PUVA for serious, generalized psoriasis that resists other treatments. Many thousands of Americans meet this criterion.

Against the risks is set the fact that PUVA treatment is so highly effective. For the some 6,000 patients who received it in the United States and Europe in the Food and Drug Administration's seven-year study, concluded in 1982, the success rate was nearly 90 percent. This for a debilitating condition which had previously resisted outpatient therapy.

The FDA's approval of the PUVA treatment last year represented the first approved application of a new branch of medicine called photochemotherapy, *a term coined by Dr. Parrish and his MGH PUVA collaborators, Dr. Thomas B. Fitzpatrick, Chief of Dermatology, and Dr. Madhukar Pathak. Says Dr. Parrish, "The concept of photochemotherapy, the use of a drug activated by light, may prove more important than this particular application."*

But to psoriasis victims, the current application is justification enough. The MGH received 800 calls a day when it first published results with PUVA back in 1974, many from Europe. One PUVA patient was able to enjoy sexual relations with his wife for the first time in seven years. Another was able to visit a public beach for the first time in his life.

Using the hepatitis-B vaccine

The prevention of hepatitis-B through a vaccine is new. The question now is what is the best way to put the vaccine to use.

Hepatitis-B, or serum hepatitis, which affects about 200,000 Americans annually, is the most serious of the three types of viral hepatitis. There is no effective treatment for it today. The development of a hepatitis-B vaccine by Merck, Sharp & Dohme represented the first significant advance in the prevention of the disease. But the vaccine is laborious to produce (being drawn from the blood of carriers of the disease) and expensive—about $100 for the required three injections. And the supply is limited.

"To vaccinate everyone in the United States would obviously be prohibitively expensive," says Dr. Albert G. Mulley, Associate Director of the Medical Practices Evaluation Unit which MGH established five years ago to evaluate the application of medical technology from the standpoint of the patient's health and pocketbook. The hepatitis-B vaccine, in Dr. Mulley's words, "is an expensive and limited resource."

The question thus arose as to how to use the vaccine. The MGH study found that when medical costs are the sole consideration, the vaccine would be cost-saving in populations with an annual attack rate of five percent or greater. Thus the cost of vaccination would be more than offset by the cost of medical care avoided by prevention of the disease. If costs of lost productivity are included in the calculation, use of the vaccine saves money in groups with a yearly attack rate as low as one or two percent. The annual attack rate in the general American population is 0.1 to 0.2 percent, but certain groups, such as hemophiliacs ("bleeders"), male homosexuals, drug addicts, dialysis patients and staff, staff of custodial institutions, and surgical interns and residents are much more likely to contract the disease. And many other groups, including certain health professions, have attack rates of at least one percent.

Cost-effectiveness studies are typically not conducted until a drug or vaccine has been available for several years. The MGH study of the hepatitis-B vaccine is unusual in that it was carried out before the vaccine went on the market.

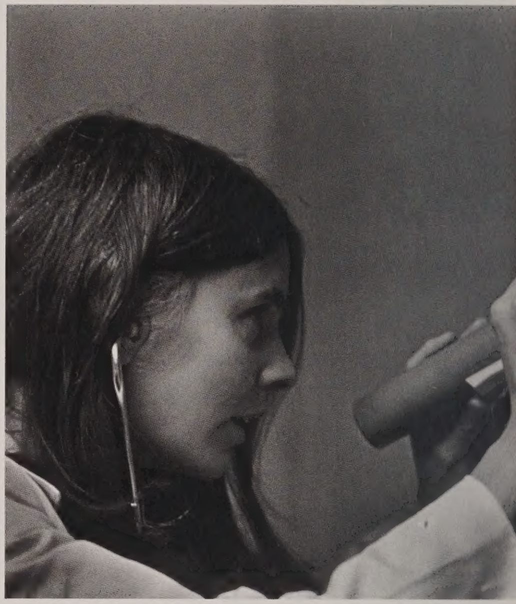
Digoxin and the third heart sound

Made from the leaves of the purple foxglove plant, digitalis has been the pharmacopoeia's strongest heart stimulant for almost two centuries. A common synthetic version called digoxin is the medicine most widely prescribed for heart failure today.

But digoxin is not an altogether unmixed blessing. No powerful drug is. It does not help all those for whom it is prescribed, and since it is toxic at a level not far above its effective dose, it can sometimes do harm. Too much of it leads to a life-threatening condition called digitalis intoxication.

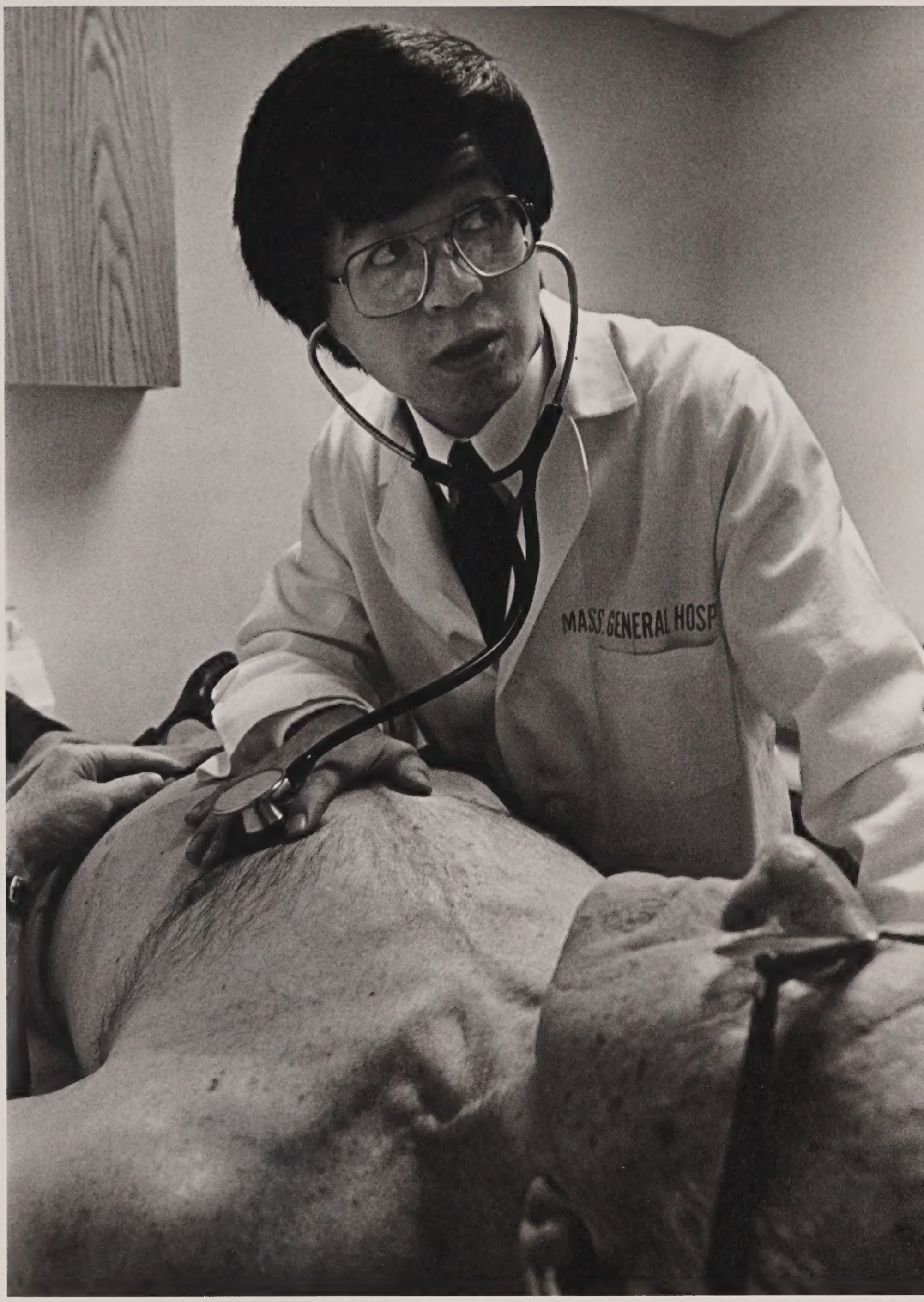
Obviously it would therefore be a great help if physicians could tell in advance if a particular patient was likely to be helped by digoxin. Until recently, this has not been possible. But now a three-year-long MGH study has shown that a third heart sound of which physicians have long been aware may be a marker that provides a reliable advance indication of a patient's likelihood of benefiting from digoxin.

As one hears it through a stethoscope, the normal heartbeat has two sounds. But some forms of heart disease bring on a third sound, thought to be caused by the impact of an enlarged left ventricle against the chest wall. Says Dr. Daniel C.-S. Lee, an MGH cardiologist and a Harvard Medical School clinical instructor in cadiology who served as this study's principal scientist, "Anyone using a stethoscope and a well-trained ear should be able to discern the presence of a third heart sound." The third sound indeed is commonplace in some heart diseases, and physicians have long been aware of it. Entirely new, however, is the demonstration of a powerful predictive relationship between the third sound and a patient's responsiveness to digoxin.



The MGH study discovered, in brief, that digoxin will probably help those patients whose hearts make the third sound, and that it will probably not help those whose hearts do not make it. This third sound rather than the severity of the patient's attack will most reliably predict the patient's digoxin response.

Physicians are at an increased risk for contracting hepatitis-B.



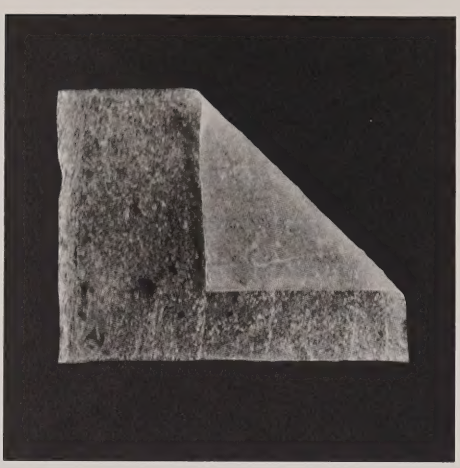
Dr. Daniel C.-S. Lee, MGH cardiologist, checking patient John Orlando for the third heart sound

Of the 25 patients followed in this double-blind study, 14 had the third sound. Digoxin helped all but one of these 14. Of the 11 patients who lacked the third sound, digoxin helped only one.

"Heart failure is not as homogeneous as most of us have believed in the past," comments Dr. Lee. "It can be the end result of a number of different pathways. It is important for physicians to be aware of the different causes of heart failure and to begin to appreciate that the treatment for each of the causes may be different."

The MGH doctors have recommended that digoxin be used with greater caution than formerly thought prudent. Patients who respond to mild doses of a diuretic may not need digoxin at all.

"Stage 2" artificial skin, tested so far only on lab animals, interacts biologically with the recipient's tissues and stimulates regeneration of the lost segment.



New Skin

Last year we were excited to report that a 10-year-long MGH/Shriners-M.I.T. research project had created an artificial skin and demonstrated its effectiveness in the cases of 10 severely burned patients, of whom at least three would almost certainly have died without the new procedure.

We are excited again this year to report that the same medical research team has taken the art of artificial skin to a still higher level.

The new artificial skin, called "Stage 2," has been used so far only on guinea pigs. Proof of its value can only come from patient tests, which may be years away. But the animal tests are most encouraging.

To prepare the Stage 2 skin, the investigators first collect basal skin cells from a healthy area on the patient's body by means of a simple biopsy. After being separated–also a simple procedure–these cells are then driven by centrifuge into the latticework of a sheet of two-layered artificial skin, which is thus made ready for application to the thoroughly cleaned wound.

The upper layer of this artificial skin is made of silicone rubber. It protects the wound from infection and loss of fluid, the two main problems in the treatment of severe burns. This layer is ultimately removed.

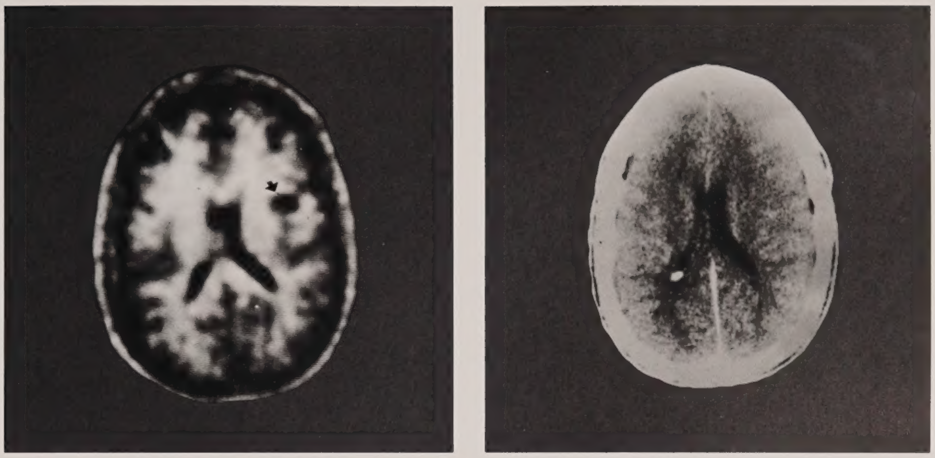
The underlying layer, in which the culture of the patient's skin cells has been embedded, consists of interlaced collagen fibers chemically bonded to a polysaccharide, a starch-like substance. Both collagen and the polysaccharide are components of connective animal tissue such as tendon, bone, blood vessels, and skin. For convenience, the collagen used in this application is taken from cowhide.

The collagen "template," as researchers call it, acts as a support structure in which the seeded skin cells actually regenerate a new epidermis, speeding the healing process, reducing scarring and eliminating the need for later epidermal grafts.

The research team is led by Dr. John F. Burke of MGH-Shriners and Ioannis V. Yannas, Ph.D., of M.I.T., who have been working together on artificial skin for more than a decade. Dr. Burke is chief of MGH Trauma Services and chief of the MGH Burn Unit as well as Helen Andrus Benedict Professor of Surgery at Harvard Medical School. Dr. Yannas is professor of polymer science in the M.I.T. Department of Mechanical Engineering and in the Harvard-M.I.T. Division of Health Sciences and Technology. The original artificial skin of their creation has been used experimentally in the last three years on more than 30 severely burned patients aged from 5 to 90, some receiving artificial skin grafts on more than 50 percent of their bodies.

The researchers emphasize the interactive character of the new artificial skin. Unlike an inert adhesive bandage, the artificial skin interacts biologically with the living tissue it touches and actually stimulates the regeneration of the lost tissue segment. The membrane almost at once mobilizes the resources of the test animal's tissues to reconstruct the missing organ segment in its original location. The promptness with which Stage 2 membranes can be used to close large wounds combined with their ability to induce the growth of permanent, functionally and thus far aesthetically acceptable new skin tissue in animals sets the new artificial skin apart from previous approaches to the problem of wound-healing.

The scientists concluded their first report on Stage 2 membranes with a fascinating speculation for future research–the idea of regenerating other organs and tissues of the body by the use of seeded collagen templates. They wrote, "Perhaps appropriately designed biodegradable templates can be used to regenerate segments of other tissues or organs which have become lost or dysfunctional due to disease or trauma." The applications of the Stage 2 technique may thus one day extend beyond the regeneration of skin to the whole range of living tissue.



An NMR image (left) revealed a tumor (see arrow) that was not detected by CT scan (right).

The NMR breakthrough: the body transparent

Scientists reserve the word "breakthrough" for very few research advances. The development of artificial skin was one. NMR is another.

Among the more revolutionary achievements of modern medical technology is its growing ability to show us the inside of the body without invading it. First in 1895 came the X ray, a medical tool in its own way as powerful as ether, which preceded it by 49 years. Then came the great extensions of the X ray: computed tomography or CT scanning in the early 1970s; then ultrasound, a medical application of the principle of sonar; then a refinement of X ray called digital subtraction angiography, which permits the X raying of blood vessels without the discomfort, risk, and expense of conventional angiography.

And now the newest addition to the physician's diagnostic arsenal, and easily one of the most powerful: nuclear magnetic resonance imaging –for short, NMR–a technology that makes it possible, without irradiation or the swallowing of radioactive or indeed any substances, and without pain or evident risk to the patient, to see within the body, and into the organs themselves, at a level of detail never before possible.

The body and its inner parts are becoming literally transparent.

NMR imaging works because the nuclei of certain atoms in the body, such as hydrogen ions, normally spin on axes that point randomly in all directions, but can be aligned by a sufficiently strong magnet to point all the same way, much like iron filings along the lines of force of the magnetic field. With the atoms thus artificially polarized, a brief radio signal is beamed at the body area of interest. The radio signal knocks the atoms out of magnetic alignment, as though a spinning top were given a little push. When the radio signal is turned off, the nuclei take a moment to recover their magnetic polarization; during this moment, they emit tiny radio signals of their own which are detected by the NMR antenna and relayed to a computer. The computer sorts out these signals and displays them on a TV screen as a three-dimensional image of the subject body part, through any cross-section desired, an image moreover whose properties vary according to the state of health of that part. As pioneering specialists become more expert in interpreting the variations of the NMR picture, they broaden the scope of NMR's diagnostic powers.

The MGH was among the first hospitals to study and employ CT scanning, and along with the medical center of the University of California at San Francisco was the first to become involved with NMR imaging studies. Drs. J. Phillip Kistler and Ferdinando S. Buonanno of the MGH Neurology Service have so far used NMR imaging to evaluate some 200 patients suffering from such neurological disorders as stroke, brain tumors, and multiple sclerosis. The doctors quickly discovered the high sensitivity of NMR imaging as compared to the CT scan, especially in finding low-grade tumors that infiltrate the brain. In one patient whose CT scan was negative, the NMR result was clearly positive, and a biopsy later disclosed a low-grade tumor, an astrocytoma, just where the NMR picture showed it.

"Whether NMR will one day replace the CT scanner in diagnosing certain neurologic or other diseases, only time will tell," says Dr. Joseph B. Martin, MGH Chief of Neurology (and former MGH Interim General Director). But "on the basis of what NMR imaging has demonstrated thus far, one cannot help but be optimistic about its future usefulness in patient care."

Harvard Medical School's 200th Anniversary

Fiscal 1982 was a year both for celebration and sorrow at the MGH. Celebration first because the institute with which MGH has shared its entire history observed its 200th anniversary.

Harvard Medical School came into being in 1782, its first 3 professors presenting their first lectures to a handful of students. Six years later two students were the first to graduate. For the next 25 years, no graduating class of Harvard Medical School was larger than five.

In 1810, two of the school's original faculty members, Drs. John Collins Warren and James Jackson, circulated a letter among Boston's more affluent citizens seeking financial backing for construction of a general hospital in the city. A hospital would afford relief and comfort to thousands, argued the doctors. In addition, a general hospital is indispensable in the teaching of medicine. "On what other objects," asked Drs. Warren and Jackson in their written appeal, "can the superfluities of the rich be so well bestowed?"

The doctors' initiative resulted in the establishment of the MGH, the charter being awarded in 1811 and the Bulfinch Building opening its doors to the first patient a decade later.

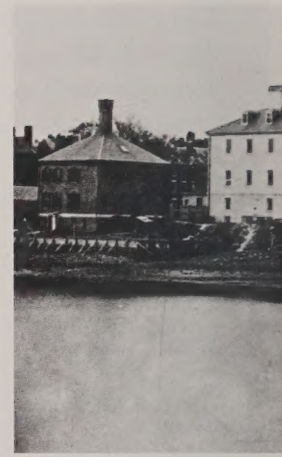
Thanks to Dr. Martin

We also celebrate our good fortune in Dr. Joseph B. Martin, who served the MGH so well for ten months as its interim general director, advancing the hospital's cause on several difficult fronts and achieving his successes diplomatically. When Dr. J. Robert Buchanan relieved Dr. Martin of those duties last July, the interim leader returned full time to his position as Chief of Neurology and his brilliant research career.

In memory

MGH staff and friends were saddened by the loss this year of three cherished members of the community.

Benjamin Castleman, at 76. Dr. Castleman was a former Chief of Pathology and Acting Director of the MGH, which he served with love and distinction for more than 50 years. A professor emeritus at Harvard Medical School, he pioneered the development of the role of the pathologist in American medicine. He was known throughout the medical world as editor of "The Case Records of the Massachusetts General Hospital," a weekly feature of the prestigious *New England Journal of Medicine.* Nearly two-thirds of his students hold appointments in academic institutions, and 15 have been or are chairmen of university departments of pathology. The Benjamin Castleman Chair of Pathology has been created in his honor at the Harvard Medical School.



Miroslawa (Myra) Jasinska, at 54. Dr. Jasinska, a native of Poland, came to the United States in 1969 as a Clinical Fellow in Anesthesia at the MGH. She was appointed Assistant in Anesthesia in 1973 and Assistant Anesthetist in 1975. She was also an instructor in Anesthesia at Harvard Medical School. Before coming to the MGH, Dr. Jasinska was a registrar in anesthesia at a number of hospitals in England and was medical assistant and consultant anesthetist at the Royal Infirmary in Aberdeen, Scotland. Said Dr. Richard J. Kitz, chairman of the MGH Department of Anesthesia, "Dr. Jasinska was a very gracious woman and a superb pediatric anesthetist."

Myron B. Laver, at 56. Dr. Laver pioneered many of the modern techniques for the administration of anesthesia to heart patients, particularly to children undergoing open-heart surgery. He was perhaps best

Photographs reflect the mid 19th century when the MGH (left) and the Harvard Medical School were neighbors.

known for devising a procedure that allowed a five-year-old boy to accept lifesaving open-heart surgery without violating his parents' Jehovah's Witness faith; his method later was extended to all cardiac surgery patients. Before leaving the MGH in 1979 to assume chairmanship of the Anesthesia Department at the University of Basel, Switzerland, Dr. Laver was Professor of Anesthesia at Harvard Medical School. In the early 1960s, Dr. Laver established the MGH's Acute Care Laboratory, which does blood studies on critically ill patients for whom rapid results are required. Says Dr. Edward Lowenstein, who succeeded Dr. Laver as director of this laboratory, "Dr. Laver was the prototype of the modern anesthesiologist, who applied to the care of all critically ill patients the knowledge and skill of life support gained in the operating room."

The General Hospital Corporation
Boston, Massachusetts 02114

Excerpts from audited financial statements

Income	1982[*]	1981[*]
From patient care	$263,050,333	$228,909,097
Less free care and contractual allowances	33,790,073	28,531,511
	229,260,260	200,377,586
Research and other specific purposes	73,163,299	59,786,427
Indirect cost recoveries	9,557,242	7,442,683
	82,720,541	67,229,110
Other	14,473,193	12,269,561
Total Operating Revenue	326,453,994	279,876,257
Expenditures		
For operating expenses: Salaries and Wages	137,119,072	119,729,439
Supplies, expenses, other charges	119,054,905	103,503,647
	256,173,977	223,233,086
Research and other specific expenses	73,163,299	59,786,427
	329,337,276	283,019,513
Surplus (Loss) from operations	(2,883,282)	(3,143,256)
Endowment and other income	3,341,045	3,453,175
Surplus (Loss)	457,763	309,919

[*] Year ending September 30, 1982

1981–82
Massachusetts General Hospital Facts and Figures

1,092	Beds
31,236	Number of Admissions
457,397	Number of Ambulatory Care (Clinic) Visits
19,330	Inpatient Surgery
90,428	Emergency Ward Visits
6,089	Day (Outpatient) Surgery
1,218	Active Staff
237	Clinical Fellows
415	Residents
189	Research Fellows
920	RNs
140	LPNs
90	Nursing Assistants
918	Volunteers
8,435	Employees

The Patient's Dollar

Diagnostic and Therapeutic Services: *Diagnostic services, therapeutic services, house staff and professional staff, drugs, supplies, etc.*	61.6%
Nursing Care:	14.0%
Plant and Equipment: *Depreciation, interest, energy, telephone, maintenance*	11.2%
Room and Board Services: *Food, Laundry, Security, Housekeeping*	7.4%
Administrative Services: *Computer, Accounting, Administrative salaries, etc.*	5.8%

Information

Reception area of the new Ambulatory Care Center

The Massachusetts General Hospital

as of 12.31.82

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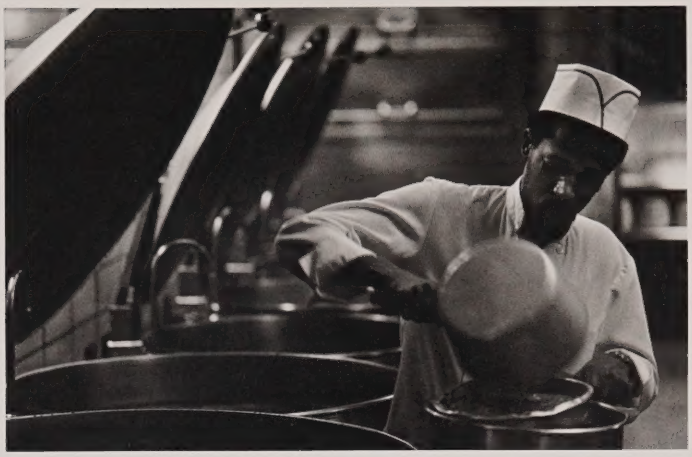
An MGH kitchen



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as of 12.31.82

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• *leave of absence*

The MGH flower shop

Ways of giving. From its founding in 1811 to the present, the Massachusetts General Hospital has been a monument to the generosity of private citizens. The simplest method of giving to the hospital is the gift of cash, but it is also possible to give securities, personal property, real estate, or life insurance. In addition, many companies have matching gift programs that double or even triple the value of a gift given to the MGH.

For an individual who has a greater annual income than is needed for current expenses, a *Charitable Lead Trust,* or the contribution of an "income" interest made by a transfer of property into a trust, may be appropriate.

It is also possible to take advantage of the various Life Income Plans offered by the hospital. The *Pooled Income Fund,* for instance, is a trust in which contributions of many donors who have retained life interests are pooled, operating in a fashion similar to a mutual fund. Other life income plans tailored to the specific needs of the donor are available.

Benefaction through bequests has played a vital part in the growth and development of the MGH. Funds may be left in the form of a *cash bequest; a bequest of all or a stated percentage of the residue of an estate,* or *a bequest of a remainder annuity trust or unitrust.*

Should you plan to include the hospital in your will, or should you be interested in one of the types of gifts described, the hospital could suggest to you or your lawyer specific wording for carrying out your wishes.

Please contact Joseph C. Donnelly, Jr., Director of Development (telephone: [617] 726-2200), with any questions regarding your gift to the MGH.

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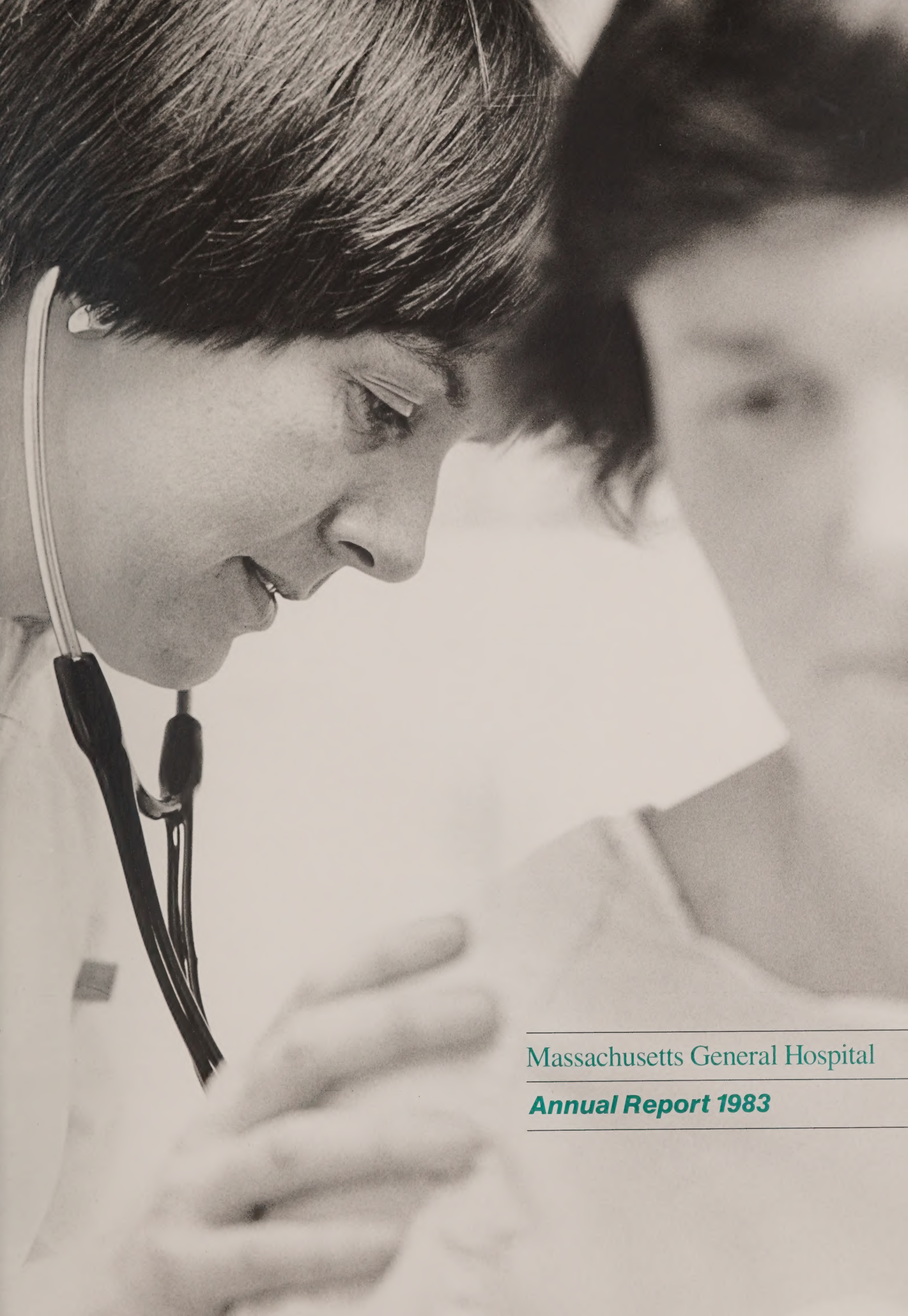


Massachusetts General Hospital

Annual Report 1983

We who work in hospitals
see courage all the time.
It is in the patient who must face
a still unconquered disease
or a maiming injury.
It is in the physician
who must take a new treatment
from study to application
and face the irreducible risks.
It is in the medical people of all kinds –
the nurses, the therapists,
the specialists in care –
whose profession obliges them
time after time to rally their emotions
for new struggles against pain and death,
often under emergency conditions . . . .

The record of our fiscal year 1982-83 at MGH seemed to us especially rich in stories on this theme. Our patient William Anderson, for example, whose story is told in more detail on page 4, lost half of each hand in an explosion in 1977. But he never thought of giving up or of using his misfortune as an excuse. He taught himself how to pull his resources together and go on.

Another kind of courage is shown in Mr. Anderson's physician, Dr. James W. May, Jr., our Chief of Plastic Surgery, who developed and applied the remarkable procedure by which the fingers from Mr. Anderson's unusable right hand were transferred to his left, giving him one whole hand.

Or the case of Terry Elio (see page 5), who fought for years against leukemia and not only prevailed but at the same time, through sheer refusal to surrender to her disease, made herself a high school tennis champion.

Or there is the different but palpable courage of the entire team of medical people who battled so long for the life of little Isabel Gutierrez from Colombia, born virtually without a chance of surviving, she had so many congenital heart defects.

Or the courage of entire families that we see when Alzheimer's disease strikes, and spouses and children and close family friends are forced to cope with the degeneration of a loved one's memory (see page 7).

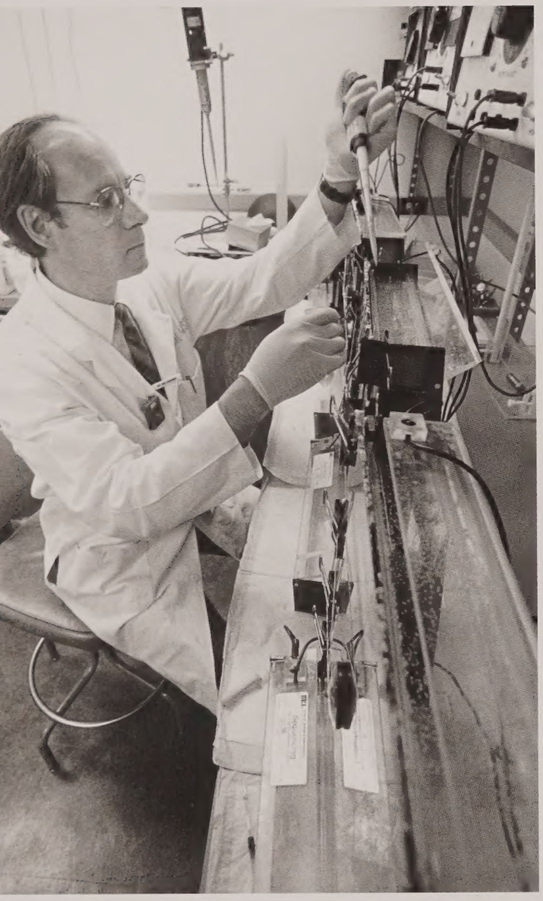
Courage isn't something you can easily put a quantifiable value on, so it doesn't get factored into the equation of institutional management. Nonetheless it is basic to the whole operation of the modern hospital. Sometimes in fact it seems to make the world go around, along with love. But then you could almost define courage as the behavior of love under stress. We dedicate this edition of the annual MGH report to all those whose courage in the health care setting glorifies and makes possible our lives.

Cover:
Dr. Sandra Sweetnam

2
Chairman of the Board
4
Rebuilding a hand
Terry Elio
Isabel laughs
Alzheimer's disease
Cyclotroning AVMs
8
Sleep Disorders Clinic
Hewes Arthritis Clinic
Revere Health Center
12
Preemie follow-up
Child GI
Foster family
15
Preventive medicine:
Nutrition and cancer
Testicular cancer
15
Teaching:
Medical ethics
Ionta Lecture
16
IHP: first degree
16
Research:
Monoclonal antibodies
Greenhouse for plant DNA studies
Vitamin D research
Setting the fetal clock
Laser lab
Getting at the source of pain
Interferon against CMV infection
Liver cancer pump
Insulin pump
On the track of human LH
Mass hysteria
Working women inhibitions
26
Cost containment
and unreimbursed expenses
26
Knight gift
26
Cochrane research fund
27
Dr. Baker appointment
27
Mary Macdonald
27
Dr. Myles Baker
27
Dr. Jacob Lerman
29
Financial Statements
29
The Hospital's Dollar
29
Facts and Figures
30
The Massachusetts
General Hospital
Members of the Corporation
The General Hospital Corporation
Administration
Chiefs of Services and Departments
32
Ways of Giving

From the Chairman of the Board

The greatest portion of our annual story is always told most significantly in terms of the doctors, researchers, teachers, and other health care professionals and their patients who lived out many ordeals and adventures. You will find elsewhere some of the highlights of the 1982-83 medical year at the MGH–rebuilding a man's hand or an infant girl's heart, for example, or tracking down the further mysteries of the immune system or the genetic code.



From the perspective of the trustees, however, we must constantly remember that these miracles wrought by a combination of dedicated care and modern science must be aided and encouraged by the provision of adequate plant and equipment in which to perform them. I am therefore happy to report continued progress in our program to modernize our physical plant. Final touches were added this year to our new Ambulatory Care Center, which receives more than 400,000 visits annually. The new Wellman Research Building was completely framed and on schedule for completion late in 1984. And enrollment at our new Institute of Health Professions grew to 90 students.

By the end of the calendar year we had met the interim goal of $65 million which we had set for our Capital Campaign, and this was accomplished by hard work on the part of great numbers of people. Families associated with the hospital also contributed generously, among whom were Arthur O. and Gullan M. Wellman of Florida, who had previously pledged $15 million to the hospital for the new research building. With new sums to construct a laser laboratory and to complete the Wellman Laboratory in the new research building, their total pledge stands at $16.7 million. Future generations of patients will benefit from their generosity.

We gratefully acknowledge as well the extraordinary support of the Knight Foundation of Akron, Ohio, and James L. Knight of Miami, Florida, who together announced a joint gift to the MGH of more than $3 million. The gift honors the Foundation's creator, the late John S. Knight, and his brother, James, who built a single newspaper into one of the nation's leading communications companies. The Knights offered their gift in recognition of Dr. W. Gerald Austen, MGH Chief of Surgical Services, also originally of Akron. The Knight contribution will provide an entire floor for surgical inpatients and another for surgical research.

MGH maintains its reputation throughout the world, as evidenced by the gift of $1 million that the Hinduja Foundation from Bombay, India, has donated to the hospital for a major research laboratory. Donations this year of more than $1 million were received from the Cabot Foundation Charitable Trust, the Thomas Pappas Charitable Foundation, and the Harland K. Simonds estate.

Since the Capital Campaign was opened in 1981, 70 corporations have contributed $3.4 million, and more than 100 foundations, $9.1 million. The rest of the $65 million total raised or pledged at the end of calendar 1983 was contributed by individuals. We are grateful to all of them and would like to list them all but space forbids. I would like to acknowledge our gratitude to the wives of the Boston Bruins hockey team, who have volunteered to lend a special hand to the MGH Children's Service, and to the large and growing number of volunteers serving on fund-raising committees in many Massachusetts communities outside Boston.

Most of the readers of this report will scarcely need to be reminded that control of the costs of health care is a major objective of any provider organization today. Under the able leadership of our General Director, Dr. J. Robert Buchanan, and with the dedicated support of the medical staff, administrators, and indeed everyone at MGH, we have made dramatic and encouraging progress in holding down expenses without in any way lowering the high standard of quality to which we are unalterably committed. New laws and regulations, plus continuing reduction in support levels, make it clear that all hospitals, and in particular large metropolitan teaching hospitals like the MGH, are facing a period of great difficulty and uncertainty.

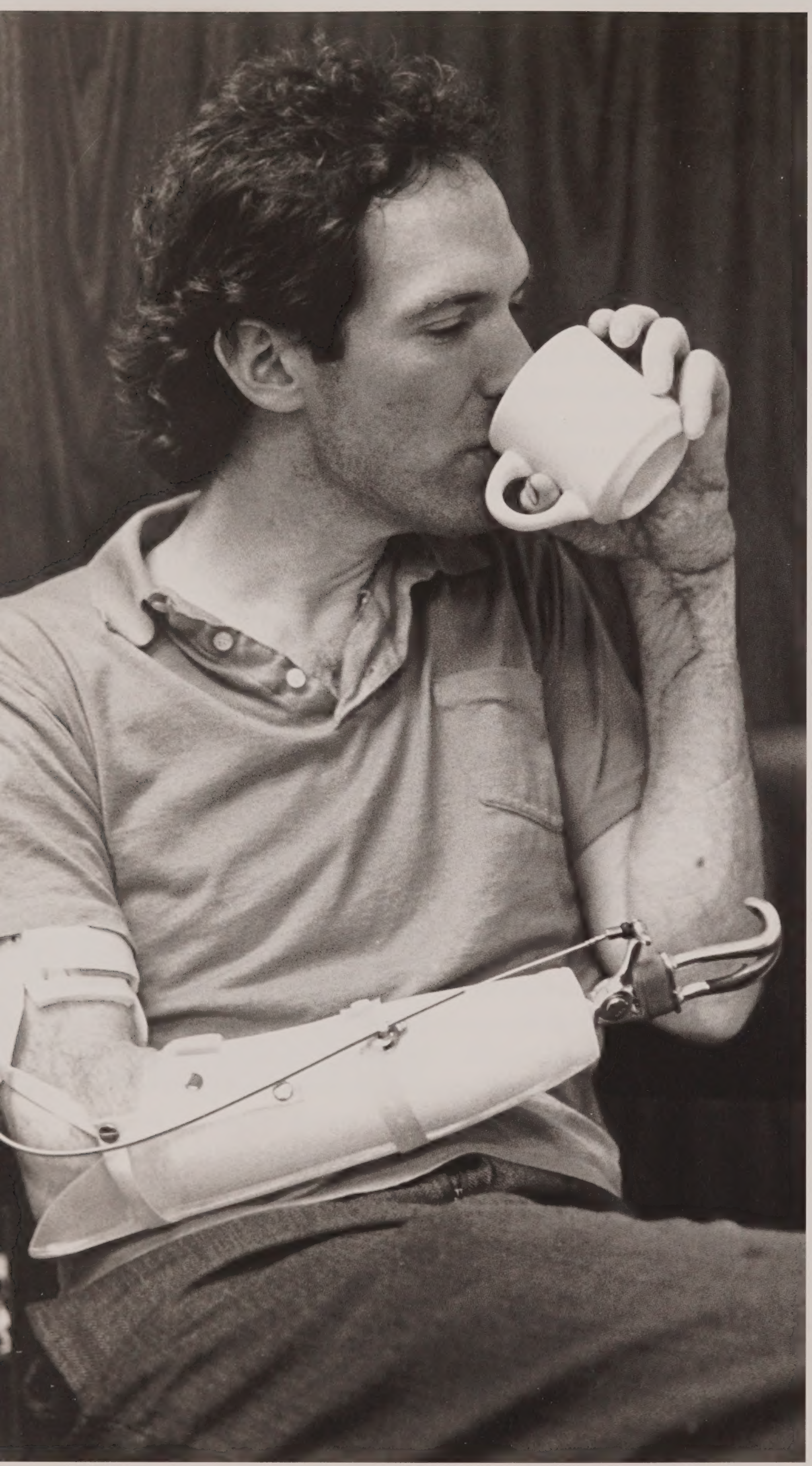
The Capital Campaign was launched three years ago. Despite its auspicious beginning, we are faced with the fact that modernization of our plant and endowment of necessary professorships at our Institute of Health Professions will require even more funds than our projections showed three years ago.

The reader might say, "Why did we permit our plant to decline and become obsolete?" The reason is that over the years when we have been faced with the hard choice of replacing bricks and mortar or using funds to make dramatic advances in medical care, we have chosen the latter course. However, even the most dedicated people accustomed to austere working conditions perform better given adequate surroundings and equipment. The quality of patient care particularly, our greatest pride, is bound to suffer eventually if our buildings and facilities are obsolete and inefficient.

Thus, we are in an interlude between the first and second stages of our Capital Campaign. Whatever revised goal we ultimately set will not be easy to attain. Nevertheless I know that with the support of our many friends the MGH will renew its plant so that the hospital can continue to provide the kind of care which has characterized the first 172 years.

Francis H Burr

Francis H. Burr, Esq.



1

Rebuilding a hand

William Anderson was loading a Revolutionary War cannon in a Concord cemetery for an annual ceremonial firing on Memorial Day, 1977, when the gunpowder exploded prematurely. Seriously burned on his face and body, Mr. Anderson lost the fingers of his left hand and the thumb of his right. He was hospitalized for two months.

Mr. Anderson was 29 then. Apart from his injuries, he was in good general health. He was also a man of great personal courage and willpower. He refused to let his injuries get the better of him. A professional photographer, he learned how to use his camera by hooking it to the right hand and operating its controls with his left thumb. He used his teeth and lips to load film. He also taught himself how to use a heavy video camera and was cameraman on a prize-winning TV production team. He became an independent video producer.

But at last he had to give up hope of regaining the use of his right-hand fingers. There had been some chance of the nerves regenerating themselves, but after five years and no improvement, it became clear that the damage to the brachial plexus nerve had simply been too massive. The fingers were healthy but would never be of use.

This brought Mr. Anderson to reconsider an option that had been discussed but set aside in 1977, when he was first introduced to Dr. James W. May, Jr., Chief of the MGH Plastic Surgical Division. On the premise that one complete hand was better than two halves of which only one was even partly usable, Dr. May had proposed surgical amputation of the right-hand fingers and their reattachment to the thumb and palm of the left hand.

This transfer was carried out at the MGH on February 22, 1983, by an eight-member surgical team headed by Dr. May. In the 20-hour-long procedure, this team moved Mr. Anderson's right hand to his left hand. The surgeons also reshaped the fingers and connected nerves from his original right index finger to his left little finger, from his original right middle finger to his left ring finger, etc. As a result his right index finger looked and felt like a left little finger, etc.

The MGH has pioneered the field of limb replantation since it carried out the first successful procedure in 1962, replanting the right arm of a Little Leaguer named Everett Knowles. As for Mr. Anderson, Dr. May pointed out at the close of the period covered by this report that it will take several more months for the nerves to grow out and that in any case there can be no guarantees with surgery as advanced as this. At the present time, Dr. May and his colleagues find that the patient is continuing to do well and are confident that the results will be good – that Mr. Anderson will come out of it with a usable left hand with thumb and fingers that work together, and that surgical medicine has taken another step toward the time when the entire human body can be repaired and restored.

2

Terry Elio

Terry Elio of Winchester High was already a budding hometown tennis star when she suddenly developed severe leg cramps while competing in a tournament at Yale. Doctors at first dismissed her symptoms as caused by the damp cold weather on the court that day, but her program of swimming and massage did not bring relief; and then the cramps spread to her arms. Her family physician examined her, found her red blood cell count to be low, and referred her to the MGH and Dr. John T. Truman, Chief of the Pediatric Hematology-Oncology Unit at the MGH. Dr. Truman's bone marrow test revealed that Terry was suffering from acute lymphocytic leukemia.

Terry at once began a program of intensive chemotherapy. After five days in the hospital she went on a regimen of pills that included the anticancer drugs prednisone and dexamethasone, allopurinol to help her kidneys dispose of all the destroyed disease cells, cimetidine to prevent a stomach ulcer, and colace to protect against constipation. Then came daily injections of the anticancer drug asparaginase, followed by a round of radiation treatments, and spinal shots.

Eight months after it all began, with Dr. Truman's approval Terry was back on the tennis court, regaining her stroke. In 1982, at 16, she was selected to the *Boston Globe*'s All-Scholastic Team.

Terry will not be regarded as cured until the seventh year of her remission, but as with so many with childhood leukemia these days, she is off drugs completely and living a full life.

Isabel laughs

Three-year-old Isabel Cristina Gutierrez of Cali, Colombia, arrived with her mother at the MGH in September 1982 in a state of emaciation, lethargic, on the edge of death, and her skin blue from lack of oxygen. All her problems traced back to one central condition – a congenital heart malformation know as "tetrology of Fallot" in which four major defects of the heart appear simultaneously. Isabel had had an earlier attempt at cardiac surgery at another institution which was unsuccessful but which left her with an infected and severely failing heart with residual holes, leaking valves, and heart block, as well as nonheart complications that included a stroke, liver and kidney failure, and severe malnutrition. She was literally wasting away with barely enough energy to lift her hand.

Isabel's examining physician, cardiac specialist Dr. Richard R. Liberthson, doubted that he had ever seen a sicker child. But he was able to assemble a team of doctors, nurses, and support people, all of whom donated their services, that was ultimately able to overcome Isabel's ailments one by one and put her back together again. For example, Dr. Paul R. Harmatz of the Pediatric G.I. Unit and John T. Truman of Pediatric Hematology-Oncology were called in to correct the liver malfunction. Dr. John T. Herrin of the Renal Unit dealt with the abnormal kidneys. Dr. G. Robert DeLong of Pediatric Neurology evaluated her neurologic status in view of the stroke she had endured. Dr. Igor Palacios performed her cardiac catheterization. Dr. Mortimer J. Buckley, Jr., Chief of the Cardiac Surgical Unit, repaired the defects of her heart.

In a subsequent procedure supported by the MGH Pacemaker Laboratory and its chief, Dr. J. Warren Harthorne, thoracic surgeon Dr. Alan D. Hilgenberg implanted in Isabel a $5,000 pacemaker contributed by Minneapolis-based Medtronic, Inc. Teams of nurses and support people and the Volunteer Department were constantly in attendance. It was as though the whole MGH community had resolved to save Isabel's life.

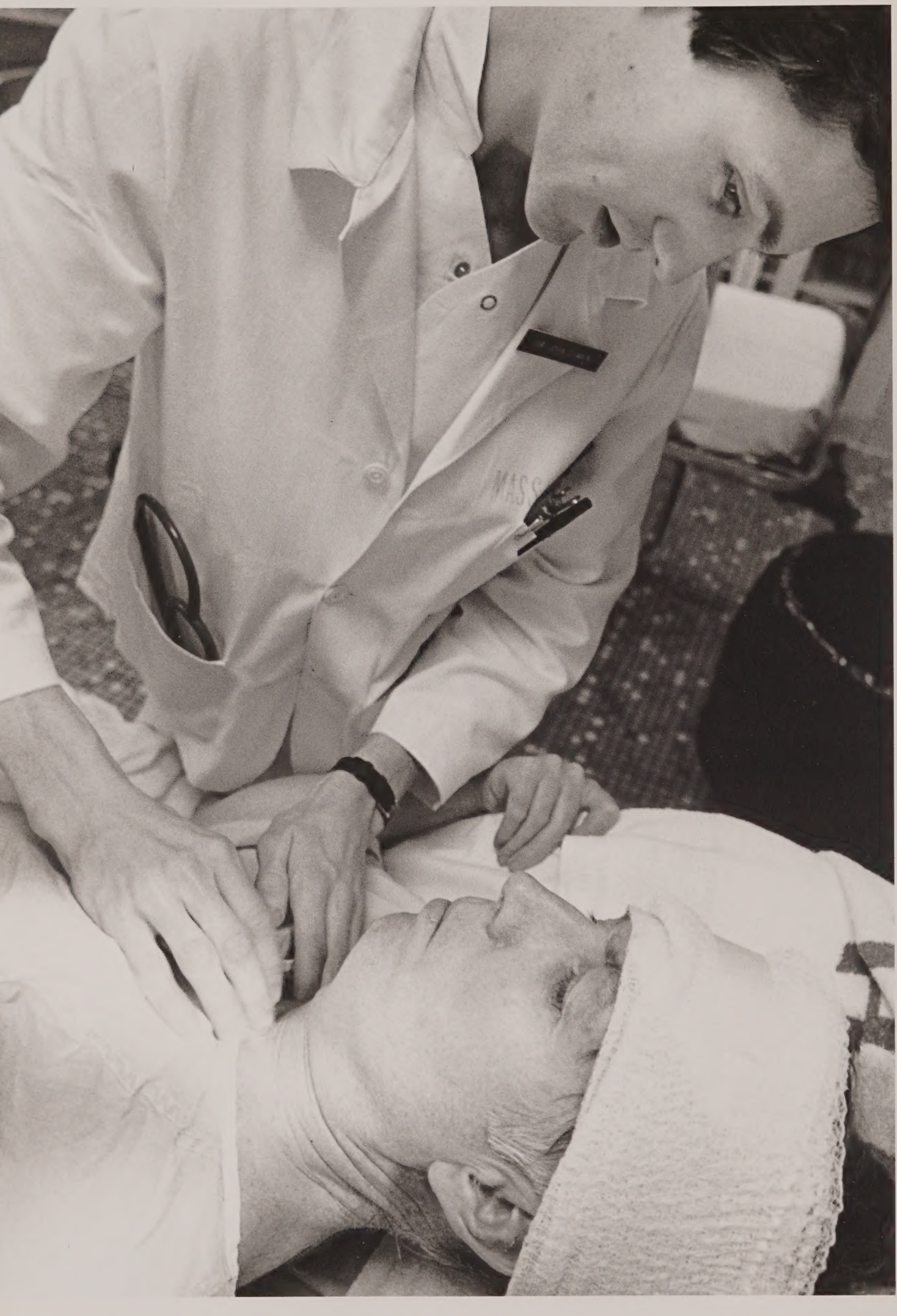
"Papa won't recognize Isabel," said mother Gutierrez at the end of their stay in Boston. For the first time, Isabel had a normal appetite and good skin tone. She began also for the first time to laugh and play with other children. She could look forward to a normal life.

3

1
William Anderson manipulates objects with his new left hand.

2
Leukemia patient Terry Elio

3
Isabel Gutierrez... once on the edge of death



1a

Alzheimer's disease

The former college professor found himself stumbling into things around the house. He was sometimes disoriented in familiar settings. He forgot how to read a book. He grew miserable, and so did his family–a wife of 30 years in seeing her once ebullient husband forget her name, a son in seeing his father incapable of feeding himself, a grandchild in seeing an ordinary trip to the market become a nightmare.

The professor's condition, an all-too-common one, was once called senile dementia or simply senility and was thought to be, for its many victims, an inevitable result of the aging process itself. The major step toward a deeper comprehension of this memory disorder as a disease was taken in 1907 when Dr. Alois Alzheimer, a German physician, first described the condition of presenile dementia and associated it with a buildup of fibrous material within nerve cells.

There the matter essentially remained, however, until the 1960s when the electron microscope revealed the ultrastructure of the major lesions. In the 1970s, biochemical analysis showed that Alzheimer's victims were deficient in certain brain neurotransmitters, such as acetylcholine, which are involved in memory.

Aware that Alzheimer's afflicts between one and two million Americans over 65–and aware that, as an aging population, Americans are sure to see this figure grow higher–the MGH set up two clinics to deal with memory disorders. The first came in late 1981 under the direction of Marilyn Albert, Ph.D., a neuropsychologist, and Dr. Michael A. Jenike, head of inpatient psychiatry, and the other the following year under Dr. John H. Growdon, a neurologist.

The clinics are mandated to afford accurate diagnosis to patients with memory problems, to treat their symptoms whenever possible, and to conduct research toward deeper understanding and more effective treatment of the disease.

"Identifying the Alzheimer's patient can be a complicated procedure," said Dr. Growdon, whose clinic is called the Memory Disorders Unit (M.D.U.). "Many Alzheimer's patients have large ventricles in their brain, and on a CT scan these can mimic the large ventricles of the patient who has treatable hydrocephalus. Many Alzheimer's patients are also severely depressed and require antidepressant medications."

The main thrust of current work at the M.D.U. is toward stimulating the brain to produce more acetylcholine. The premise here is that this compound plays a basic role in transmitting the nerve impulses thought to underlie learning and memory. The M.D.U. is also working with lecithin, the dietary source of choline, to help stimulate the brain's production of acetylcholine. Another experimental drug, physostigmine, is being used to block the deterioration of acetylcholine once the body has produced it. Along other lines, the MGH is working with a drug called piracetam, developed and marketed so far only in Europe as a "cerebral activator." A derivative called aniracetam is also being studied.

Headed by Drs. Albert and Jenike, a Geriatric Psychiatry Evaluation Team also meets weekly to diagnose and provide treatment for patients with Alzheimer's disease. A great deal of time is spent with families to determine, as Dr. Albert says, "how we can best help the family maximize the function of the patient."

The Evaluation Team attempts to treat the disorder with a variety of medications as well. With the help of MGH's famed General Clinical Research Center, patients are being given the experimental drug, physostigmine. The team is also one of a handful of groups in the nation studying use of a drug called CI-911, designed to increase cerebral metabolic activity.

Physicians stress the importance of performing autopsies on deceased Alzheimer's patients. There is no animal model for this disease, and the only tissue that can be used in research is human tissue. Only an autopsy, moreover, can confirm that Alzheimer's disease was in fact the killer.

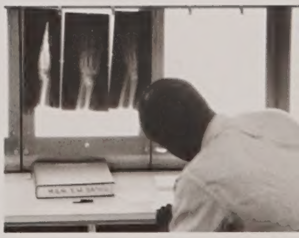
Dr. Jenike believes that progress with this mysterious disease is now moving rapidly. "I feel that we're really on the threshold of being able to understand and treat the disease," he said. "For that reason, it's a very exciting time."

1a, 1b
In the Emergency Ward

Cyclotroning AVMs

Last year we reported the use of Harvard University's cyclotron in treating certain tumors with proton-beam radiation. This year, in the *New England Journal of Medicine* (August 4, 1983), an MGH team reported that proton-beam therapy cured 20 percent of the arteriovenous malformation (AVM) victims treated with it and reduced the size of the potentially fatal tangle of arteries and veins in the brains of another 67 percent. After an "incubation" period of one to two years, lethal hemorrhages are reduced, and other AVM symptoms may be improved. The team led by Dr. Raymond N. Kjellberg, a neurosurgeon, has now treated nearly five hundred patients with similar results.

Unlike the more familiar X-ray form of radiation, which exists as waves of energy, protons are discrete particles with mass, which allows them to be accelerated to extremely high speeds and fired like a projectile. Depth of proton penetration of tissue can be precisely controlled. When the proton reaches this depth, it releases an extra burst of energy, which physicists call the "Bragg Peak." Bragg Peak proton-beam therapy has been used until recently only by MGH groups. Bragg Peak is now also available at the University of California Cyclotron at Berkeley.



1b

GENERAL HOSP

1
Electrodes are placed around the patient's head and nose to measure brain wave activity and airflow.

2
Dr. Stakes (standing) and Technician Jason Hartman study a patient's electroencephalogram (EEG), which measures eye movement, muscle tone, and heart rate.

3
Doctors use a video screen to monitor a patient's airflow.

4
Dr. Barry Oken processing basic sleep data with a computer terminal

anasonic
ROENCEPHALOGRAPH MODEL

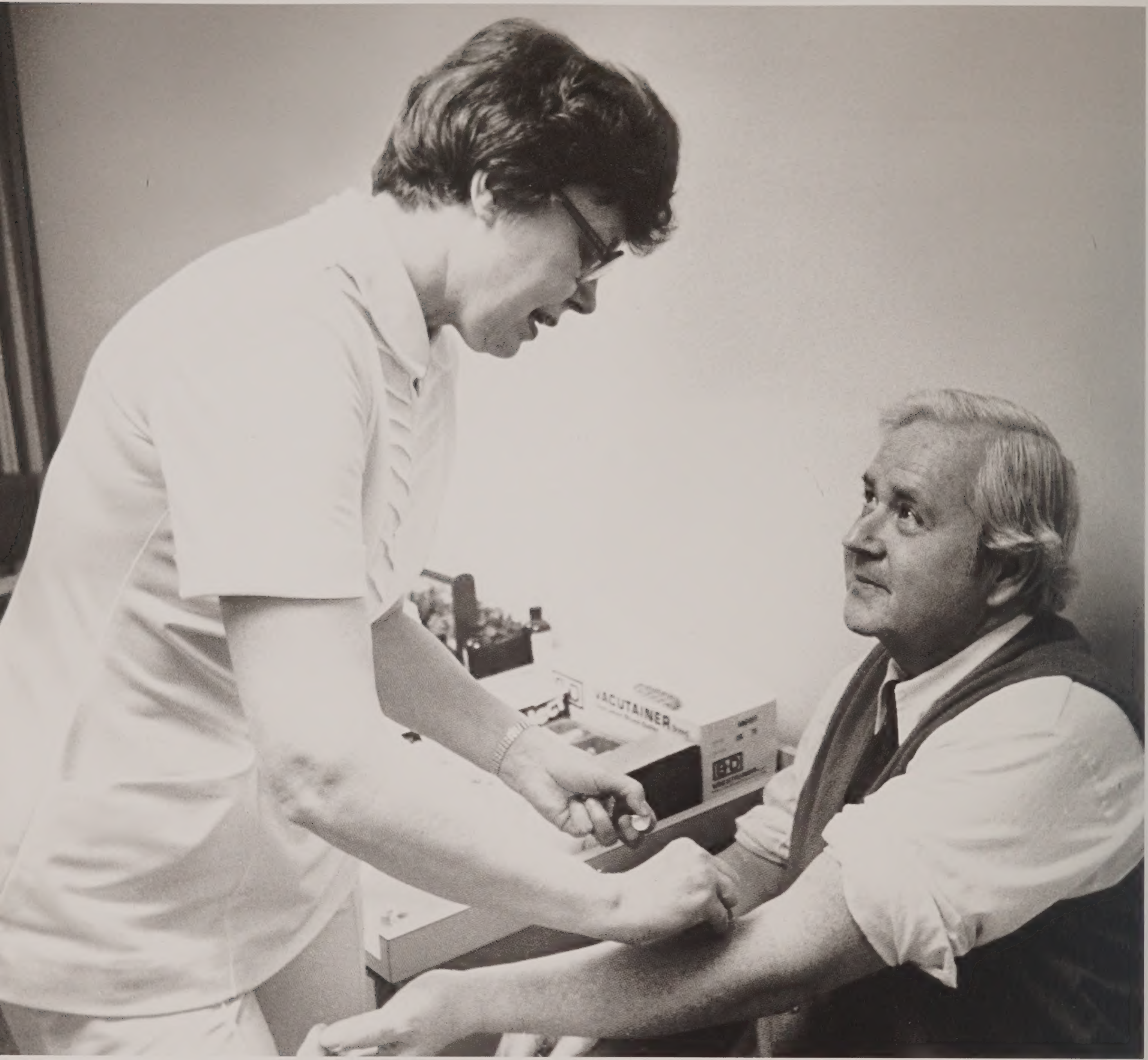
3

Sleep Disorders Clinic

An estimated 36 million Americans suffer from a diverse group of disorders that are manifested during sleep. Some stop breathing for 20 to 30 seconds many times during the night. Others' legs twitch restlessly as they fall asleep. Still others suffer from epileptic seizures only while sleeping, or have loss of bladder control, incessant teeth grinding, or severe nightmares. Some find sleep itself impossible.

To help in the struggle against the maladies of sleep, the MGH this fiscal year set up its new Sleep Disorders Clinic and Laboratory, under the direction of Dr. John W. Stakes of the MGH Neurology Service. Dr. Stakes' group is dealing with apnea (a breathing disorder), narcolepsy (an uncontrollable urge to sleep at the wrong time), sleepwalking, bedwetting, teeth grinding–the whole range of sleep afflictions faced by patients. Clinical studies in the sleep rooms of the MGH Clinical Neurophysiology Laboratory, directed by Dr. Robert R. Young, are under way to investigate such areas as sleep and manic-depressive illness, dream sleep, drug effects on sleep, and whether or not more people might emulate Edison and Napoleon and learn to prosper on four or five hours of sleep each night.

4



1

1
Helen Reid, RN, draws blood sample from Joseph Cochrane, victim of rare blood condition.

2a, 2b
In the Emergency Ward

2a

2b

Hewes Arthritis Clinic

Esther Hewes of Somerville, born in 1898, was afflicted by rheumatoid arthritis as a child and was hospitalized at the MGH by an acute attack in 1934. Yet when she died in 1981 at the age of 84, to be buried in Cambridge's lovely Mount Auburn Cemetery, Miss Hewes was remembered by scores of fond students as one of Boston's outstanding teachers of the piano. "*Spank* the keys," she would say to one young student, explaining the staccato stroke; to another, explaining legato, "a feather falling on velvet." She had the gifted teacher's instinct for the special response that each child can bring to music.

Established with $300,000 willed from her estate, MGH's Esther Hewes Arthritis Clinic, dedicated in November, 1982, honors the memory of one of Boston's most beloved and gifted teachers.

Revere Health Center

At a time when many neighborhood medical clinics are in dire financial straits and when distribution of health care to the community is a steadily more pressing social issue, it seemed appropriate and important that the MGH should decide to accept ownership of the Revere Health Center, a service which the MGH has been operating since 1981, currently with about 12,000 annual visits. The RHC in fact outgrew its original quarters at 199 Revere St., and last year the MGH purchased condominium space in the Revere Post Office building at 300 Broadway. The 4200 square feet of floor space almost triples that of the old building and gives ample growing room. The building is now being renovated and equipped and is expected to be available for occupancy in early May, 1984.

Revere is the fourth neighborhood health center–the others are in Charlestown, Chelsea, and at the Logan International Airport–to become fully a part of the MGH. Says Dr. Roger H. Sweet, Director of the MGH Neighborhood Health Center Group, "There are many styles of medical practice, but the MGH believes that its system of neighborhood centers offers the community a health care service that is comprehensive, continuous, and both affordable and accessible."

One major benefit of this system to the community and the patient is that the centers all tap into the specialist referral capabilities of the MGH. All physicians at the neighborhood centers have staff privileges at the MGH and appointments to the faculty of Harvard Medical School.

Another benefit is flexibility in that it enables the medical staff to identify any particular or exceptional needs of the community and then address them with positive programs. For example, Revere has received a large influx of Southeast Asian refugees in the past several years, mainly from Cambodia, and now fully a quarter of all patient visits to the RHC are by members of this group. Medically, this is a high-risk population with a great need for health care attention. An RHC nurse practitioner, initially funded by a grant from the Department of Public Health, works with this community and helps determine its needs. Cambodian translators, on duty 60 hours a week at the Center, and closely linked with their countrymen, help make this facility more accessible to them.

1

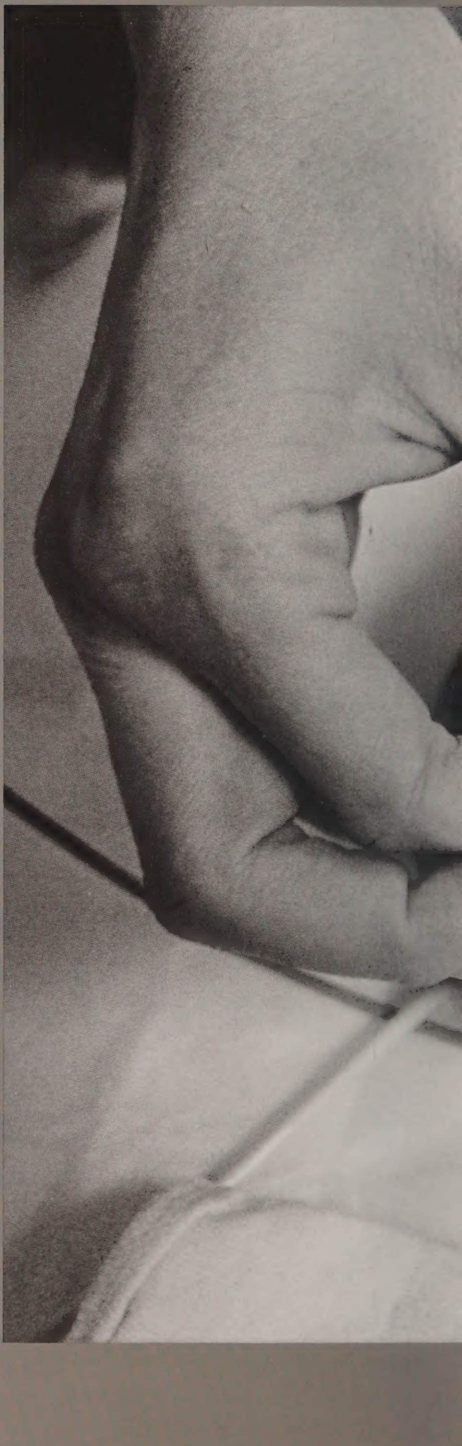
Preemie follow-up

It was not so long ago that premature birth was a virtual death warrant. The mortality rate for infants born under 2¼ pounds (1000 grams) was 90 percent.

Today, thanks to improvement in diagnostic techniques and neonatal intensive care, the tide has been turned. About 60 percent of preemies weighing between 750 grams and 1500 grams (1⅔ and 3¼ lbs.) now survive, and most survivors live normal, healthy lives.

The turnaround is in part due to new methods utilized at the MGH's Neonatal ICU. Founded 13 years ago it carries out an open-ended, follow-up program under the direction of Dr. K. S. Krishnamoorthy on all its patients to determine, among other things, the frequency of mental or physical handicaps, ailments to which preemies are especially vulnerable.

"Situations that look ominous work out better than expected." says Dr. David Todres, Director of the Neonatal and Pediatric Intensive Care Units. "Even after a serious insult to the brain, it's amazing how well a baby can recover."



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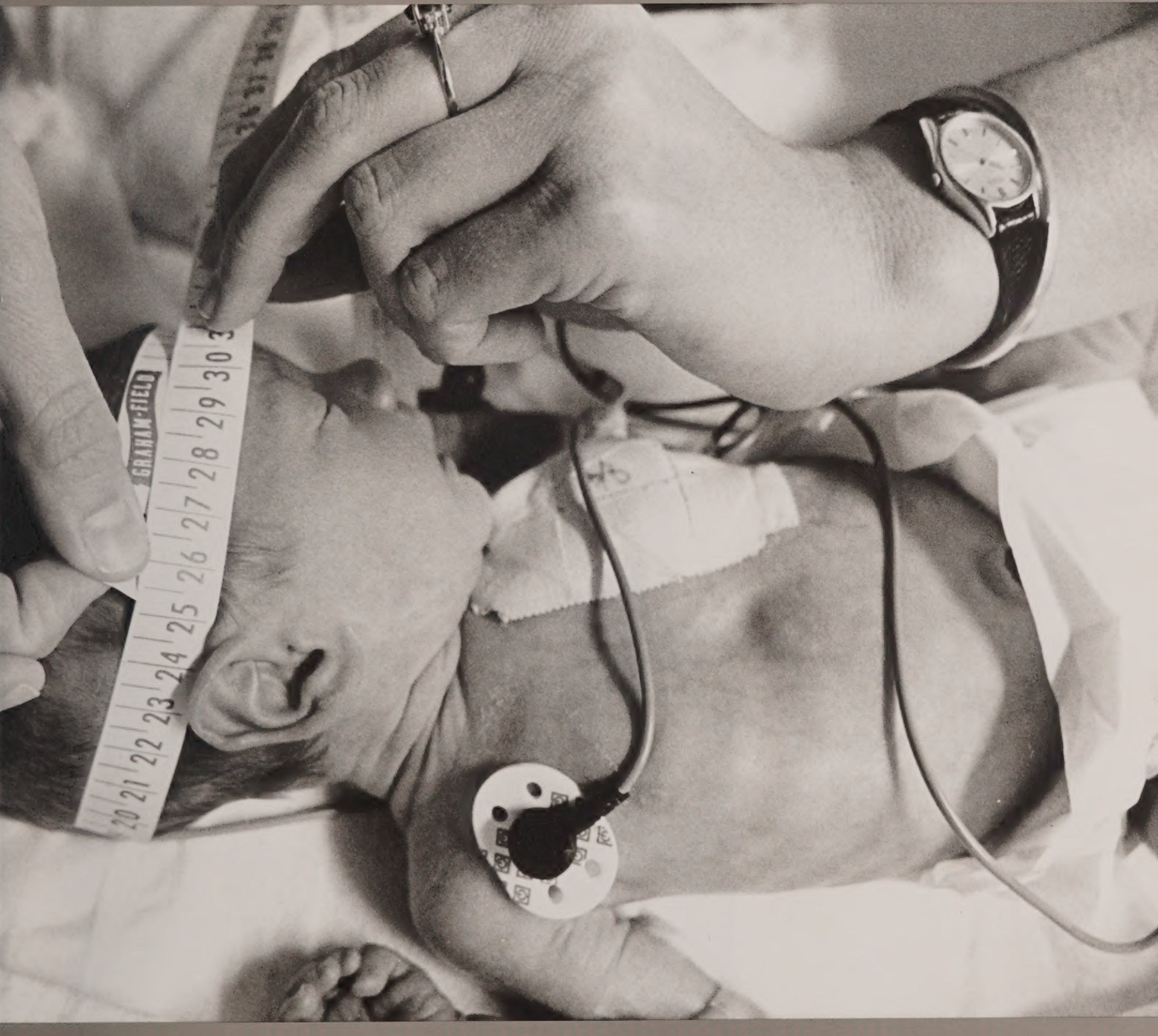

GRAHAM-FIELD
20 21 22 23 24 25 26 27 28 29 30

1
Pediatrician Lisa Stellwagen (left) and Nurse Diane Ventola place a temperature probe on a premature infant to ensure that the environment around the infant remains constant.

2a, 2b
Ann Stuart, RN, with a premature baby

1a

Child GI

The MGH and the Children's Hospital provide the two major pediatric teaching services of the Harvard Medical School. Starting this year the two facilities have combined resources for the first time to create a joint program in pediatric gastroenterology and nutrition. The new program is under the direction of Dr. W. Allan Walker, chief of the Pediatric Gastrointestinal and Nutrition Unit of the MGH's Children's Service since 1972, and recently appointed chief of the corresponding division at Children's.

Pediatric gastroenterology has existed as a specialty within pediatrics only for ten or fifteen years, established and developed largely through the programs at MGH and Children's. The field has grown quickly. "In that time," said Dr. Walker, "we have made a major breakthrough in discovering how infants' intestines function." Chronic diarrhea, for example, once a major cause of infant death, is now under much greater medical control. "Because of the work done in pediatric gastroenterology," said Dr. Walker, "the morbidity/mortality (sickness/death) of this debilitating disease area has been halved. For example, intractable diarrhea of infancy that once caused 40% mortality now results in less than 20% mortality."

An important educational result of the new combined program is the broader patient care experience it provides trainees, who can now study under experts in each area of the gastrointestinal tract.

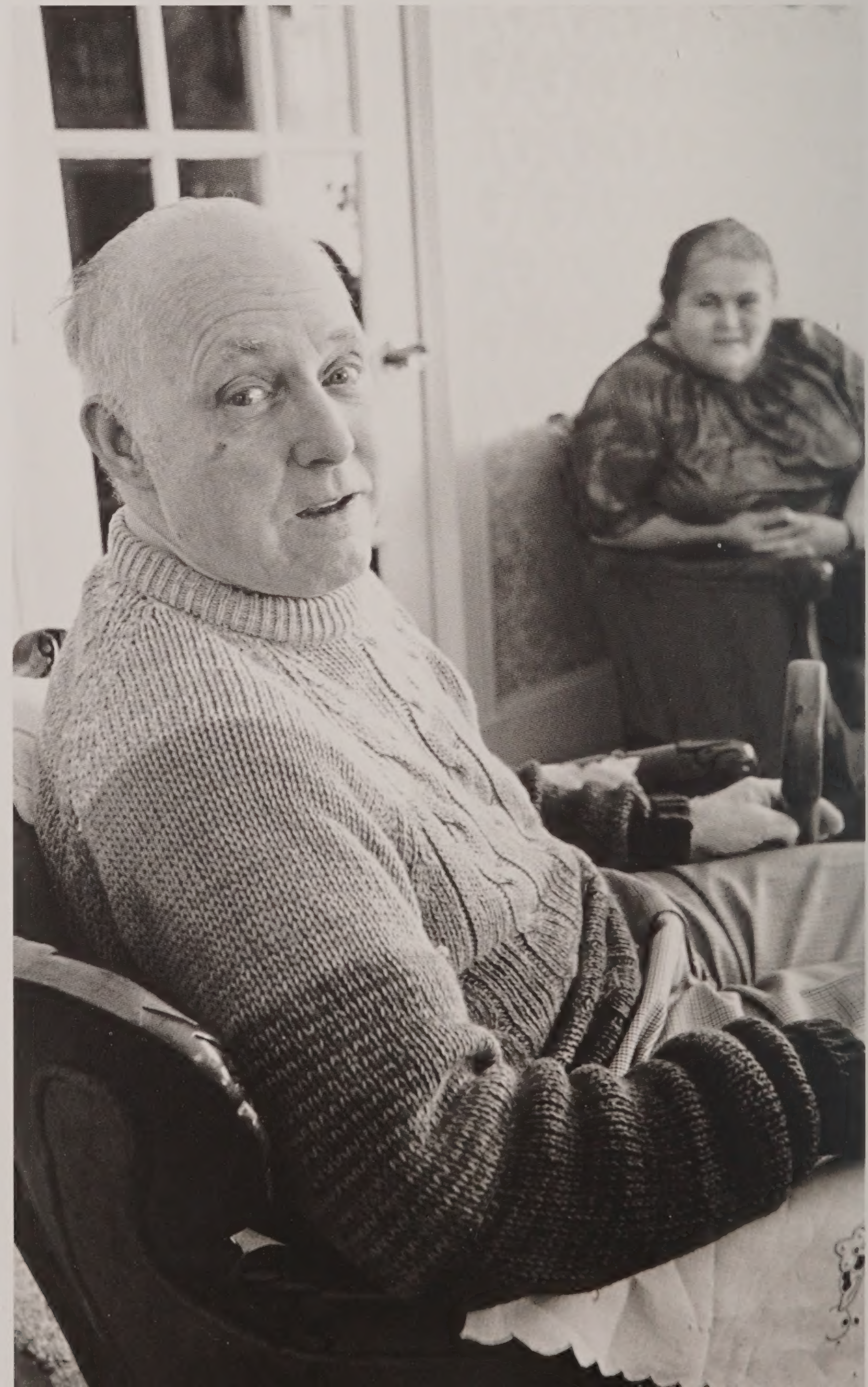
Foster family

Five years ago the MGH Social Service Department launched a program to provide foster-family care for elderly patients who are disabled or physically frail. This year we expanded the operation to include Brigham and Women's Hospital and Mount Auburn Hospital.

"Alternatives to nursing homes of all kinds are desperately needed in the community, and all hospitals share the problems of not being able to make timely arrangements for their patients," said Eleanor Clark, Director of Social Service at MGH. As a response to this problem, the adult foster-family care alternative provides good care in a domestic environment that encourages independence. It also saves thousands of dollars by keeping people out of institutions. Foster-family care, in fact, costs approximately 30 percent less than nursing home care, and in the MGH program at least it may have reduced the rate of patient rehospitalization by as much as 80 percent.

The MGH collaboration with Mount Auburn and Brigham and Women's involves training of staff, fund raising, and the finding of foster homes for participating patients, who otherwise would require skilled or intermediate nursing care or who may need help in walking, dressing, hygiene, or the like. The foster family receives $15 per day and provides board, room, laundry, and supervision. Patients and families are carefully matched, and trial visits always precede a definite placement. The MGH program has served 80 patients over the past five years.

1b



2

Preventive medicine: nutrition and cancer

Evidence suggests that two-thirds of all cancers stem from factors controllable by man. One-third are caused by things their victims eat or drink. Another third are caused by things in the air they breathe. Theoretically then it should be possible to reduce the cancer rate profoundly by cleaning up our dietary and environmental habits. But evidence pinpointing cancer-causing agents in the diet has been slow to accumulate, so that many investigators, including a team at the MGH, have been looking instead for foods that may actually protect against cancer.

In the MGH Cancer Center, for example, Dr. Sigmund A. Weitzman is a member of a Hematology-Oncology Unit team studying the ability of certain factors, including nutritional ones, to lessen the harmful effects of chronic inflammation which contribute to the development of cancer.

"The inflammatory response," explained Dr. Weitzman, "produces things called 'radicals' which can injure normal tissue. Some of the nutrients we are working with, such as the nutrients beta-carotene [a precursor of vitamin A], vitamins E and C, and selenium, may reduce the toxicity of these radicals."

Dr. Weitzman cautioned that results to date are little more than suggestive. "There have been some animal experiments in which these nutrients appeared to prevent certain types of cancer from developing," he said, "but these trials were conducted under highly controlled laboratory conditions. There is no proof that humans would react the same way."

Nevertheless, research has established that individuals who ate liberal amounts of carotene-rich foods like carrots and tomatoes seemed to face a lowered risk of certain cancers.

Preventive medicine: testicular cancer

Women have been strongly encouraged to examine their breasts every month for signs of cancer, but according to Dr. George R. Prout, Jr., MGH Chief of Urology, a kind of "gender problem" among doctors, an unwillingness to face the possible loss of a testicle, has resulted in men being not nearly so well educated on the need for regular self-examination, despite the fact that testicular cancer is the most common cause of cancer death for men in their 20s and 30s. Two thirds of all testicular cancers are of a fast spreading variety that must be caught and treated quickly to be cured.

The self-exam encouraged by Dr. Prout is straightforward. The man supports the testicles in one hand and with the other feels for lumps. He also takes note of any heavy sensations in the testicles or swelling in either the testicles or breast tissue.

Detection of any of these signs should prompt an immediate visit to a urologist. If a malignancy is discovered, removal of the testicle should not be postponed, despite traditional misgivings. When the testicle is removed within a month of the appearance of symptoms, about three out of four patients are cured, with far less chemotherapy than is otherwise unavoidable. Procrastination, on the other hand, can be fatal.

Teaching: medical ethics

Health professionals have always had to face burning ethical dilemmas. The contemporary explosion of medical technologies has only compounded the agony. Medical decisions about the individual patient have increasingly become ethical decisions about distribution of the society's goods, and the society is uncertain as to the criteria to use in making the choice. Is life always of intrinsic value, for example, to be preserved for its own sake? Even if against the will of a life-weary patient? Even if at the cost of *other* strategies of medical investment that might produce a lesser good but for a greater number? And what of bioengineering and the prospect before us of direct human intervention in the ultimate processes of life? Who decides if humanity is to play God?

Such are the kinds of questions today's medical community faces increasingly. To acknowledge their importance and their permanence within the picture of medical science, the MGH and the MGH Institute of Health Professions this year established a professorship, a symposium, and a postgraduate residency program in medical ethics.

The Henry Knox Sherrill Professorship in Ethics, endowed by Good Samaritan, Inc., of Wilmington, Delaware, honors the memory of Bishop Sherrill, former Presiding Bishop of the Episcopal Church in the United States, former President of the World Council of Churches, and Chairman of the MGH Board of Trustees from 1935 to 1947. He died in 1980 at 89. The Sherrill Professor, for whom a national search has been under way, will teach at the MGH Institute of Health Professions (the academic unit of the MGH), consult with the MGH staff, conduct research in ethics, and develop the new ethics residency program, continuing a tradition of MGH commitment in this area that reaches back to the founding of the first hospital-based social service department in 1905, the establishment in 1933 of the first formal program in clinical pastoral education, and the pioneering adoption in 1967, under Bishop Sherrill's leadership, of guidelines for research involving humans.

1a, 1b

The foster family program permits 74-year-old George McSherry to enjoy a normal home life.

2

Do some food nutrients help avert cancer?

1

Teaching: Ionta Lecture

This year the MGH Institute of Health Professions joined with the hospital's physical therapy staff to establish a special fund in honor of Marjorie K. Ionta. Miss Ionta was Supervisor of Physical Therapy at the MGH from 1958 until her retirement in 1981. She also served as chairman of the planning committee for the Institute's Graduate Program in Physical Therapy and became the Institute's first emeritus professor.

The Ionta Fund will support an annual lecture and also support development of the physical therapy graduate program and of other projects of joint interest to the MGH Physical Therapy Department and the Institute. The first annual Ionta Lecture was delivered by Stanley V. Paris, a long-time associate of Miss Ionta.

IHP: First degree

The first academic degree ever bestowed by the 172-year-old MGH was awarded this year to Bette Ann Harris, who received a master of science degree in physical therapy from the MGH Institute of Health Professions. Seven other students were awarded graduate certificates from the Institute's Social Work in Health Care Program, for a total of 22 students thus certified in the three years since the MGH launched the Institute in 1980.

The MGH is one of a very few American hospitals empowered to award academic degrees. The Institute, located on the MGH campus in Boston, awards a master of science degree in dietetics, nursing, physical therapy, and speech-language pathology, as well as a graduate certificate in health-care social work.

2

Research: monoclonal antibodies

The MGH is one of scores of medical centers around the world at which research scientists are pioneering with monoclonal antibodies, which a 1983 Food and Drug Administration report says are "every bit as important as recombinant DNA and may have a bigger impact on medical treatment than anything known to this point."

Antibodies are proteins assembled naturally by the body's immune system to fight foreign invaders such as bacteria, viruses, or poisons. The natural antibody is stimulated by the presence of invaders called antigens, and since a given invader may carry a number of antigens (not all of them critical to its life), many types of antibodies may appear at once. To a large degree, therefore, the body's immune response is nonspecific.

Today, however, some laboratories, including several at the MGH, are producing antibodies that are not only specific but easily reproduced with perfect purity and uniformity.

These are the bits of protein called monoclonal antibodies, or M.A.s for short, which appear to have extraordinary if not revolutionary potential for a great many major medical applications. Unlike many of our most powerful current medications, M.A.s can fight germs in the body without also fighting healthy tissue because they are specially constructed in the laboratory so as to react only with their target cells. M.A.s can help diagnose disease with heretofore unimaginable precision. They can search out a drug in the body and alter its effects. They can help teach the body's immune system not to reject an organ transplanted from an unrelated donor. They can speed development of vaccines. With further development in the research lab, M.A.s may even function as microscopic guided missiles capable of delivering powerful drugs to specific cancerous cells without harming healthy surrounding cells.

The MGH Cardiac Unit first became interested in the use of antibodies in cardiovascular research in 1963, a dozen years before a British laboratory developed the technique by which M.A.s are now made.

3

In this technique, the targeted antigen is introduced into a mouse, stimulating the mouse to produce antibodies against it. The antibody-producing cells are then extracted from the mouse's spleen and fused with rapidly dividing cells from a mouse myeloma culture, which have the property of infinitely reproducing themselves. Thus are formed cloned hybrid cells, or hybridomas, which produce the M.A.s. The mouse cells determine the specificity of the M.A.s, and the myeloma cells confer indefinite continued growth.

In the MGH Cardiac Unit, a research team headed by unit chief Dr. Edgar Haber showed that conventional or polyclonal antibodies can reverse digoxin poisoning, digoxin being a form of digitalis with a very narrow gap between a therapeutic dose and a toxic overdose. Dr. Haber and his associates are also investigating the use of M.A.s as a tool for diagnosing heart attack and pinpointing the damaged area as well as locating clots within blood vessels.

In the MGH Gastrointestinal Unit, M.A.s are helping the development of a new, more sensitive test to detect hepatitis-B, a viral infection of the liver which afflicts some 200 million people around the world.

In the MGH Transplantation Surgery Unit, doctors are routinely using M.A.s both to monitor their kidney and liver transplantation patients for signs of rejection and to counteract rejection with M.A.s constructed to repress specifically the body's T-lymphocytes, known to be crucial in the rejection of foreign tissue. The survival rate for transplanted kidneys has meanwhile increased from 60 percent to 80 percent.

Much basic work, of course, remains. Frequently the path from concept to application is unexpectedly hard to follow. Yet it seems already safe to say that the monoclonal antibody will be to the next great era of medical progress what the discovery of antibodies has been to the present one.

4

1

Marjorie Ionta

2

Bette Ann Harris, the first recipient of a Master of Science Degree in Physical Therapy from the MGH Institute of Health Professions

3

In the Cardiac Unit, Dr. Ban-An Khaw inspects a supply of monoclonal antibodies.

4

Dr. Charles Homcy uses a laser-equipped cell sorter in a first step to making a monoclonal antibody.

Greenhouse
manager Marilyn
Brown maintaining
just the right
conditions for
optimal plant
development

Greenhouse for plant DNA studies

An intriguing thing about the genetic code is that it appears to be universal. There may be slight differences between animal genes and plant genes, but the language in which your genes tell your body how to be itself appears to be otherwise the same as the language used by the oak tree in the back yard. It is to further our understanding of the genetic process that the MGH is now operating a 1,300-square-foot greenhouse atop the seven-story Edwards Memorial Research Building. A project of the new Department of Molecular Biology, this greenhouse is equipped with powerful, high-pressure sodium lamps designed to provide 16 hours of light every day, regardless of season. Climate is closely controlled. Air is purified through charcoal filtering. Conditions are optimal for plant growth.

"The knowledge gained from studying the basic biology of plants may one day have a direct impact on human nutrition by paving the way for better crop production," says Howard M. Goodman, Ph.D., who has joined the MGH as the first Chief of the Department of Molecular Biology and as a Harvard Medical School Professor of Genetics. His work at the MGH will continue the studies for which he won international renown at the University of California. Using techniques for growing an entire plant from a single cell, Dr. Goodman and his colleagues are presently seeking ways to isolate desirable plant genes and add them to a cell of another plant. A food plant might thus be made more resistant to drought, for example, or given a natural protection against insects, or taught to take up nitrogen directly from the atmosphere.

Researchers are also at work on the fundamental question of tissue differentiation: what makes a root cell become a root cell instead of a leaf cell?

A second greenhouse will shortly be added, this one a 2,000-square-foot facility atop the Wellman Research Building now under construction next to the Edwards Building. Both greenhouses were financed out of a general grant from Hoechst AG of Frankfurt, Germany, a leading international chemical company which funded the creation of the Department of Molecular Biology.

Vitamin D research

Daily spoonsful of cod liver oil, the fortification of dairy products with vitamin D, and the ready supply of vitamins in tablet form have made childhood rickets rare in the United States. But the disease is still with us in an adult form called osteomalacia, a softening and demineralization of the bone, which afflicts tens of thousands of older people because of poor nutrition or the slowing of vitamin production that comes with aging.

Crucial to remedy is the substance we call vitamin D, which in its active form controls the body's take-up of calcium from the diet. The substance is like a vitamin in that it can be provided by the diet, but like a hormone in that it can be synthesized by the body (in the skin, under the stimulation of sunlight). It is only in recent years that medical science has learned how the body makes and uses vitamin D, and much of the advance is owing to the work of Dr. Michael F. Holick, who joined the Endocrine Unit at the MGH in 1975 and started up the Vitamin D Laboratory.

A current project of this lab is to develop a way to supply the active form of Vitamin D directly through the skin in the form of a cream or ointment. Trials with volunteers have supported the concept of topical application and have been reported in the *New England Journal of Medicine.*

But Dr. Holick cautions that a usable therapy may still be years away. "We are only getting about one to four percent of the drug through the skin," he says. "We'd like to develop a method that would permit 40 to 50 percent of the hormone to penetrate the skin."

Other research projects have found that the active vitamin D form reacts biologically not only with bone and intestine but also with a number of organs never thought to be influenced by it, such as the pancreas, the pituitary gland, the skin, and ovaries. And a Japanese research team has recently shown that incubation of certain mouse and human leukemic cells with the active form of vitamin D will cause these cells to become normal.

Setting the fetal clock

In at least one animal species, mothers communicate the time of day to their developing fetuses, setting their biological clocks running while the unborn are still in the womb.

This was the finding, published this year in *Science* magazine, of two MGH scientists, Dr. Steven M. Reppert of the Children's Service and Dr. William J. Schwartz of the Neurology Service. Through a method of measuring the consumption of glucose by discrete brain structures, Drs. Reppert and Schwartz were able to prove that the fetus's biological clock was synchronized to the mother's. "It is extraordinary," says Dr. Schwartz, "that a part of the fetal brain is registering the time of day even before the fetus is aware of the outside world."

Dr. Reppert speculates that "this maternal-fetal communication may be generalized among mammals," but he adds that "we have much more work to do before we know how this might affect human mothers and their babies." The key mystery at the moment is the mechanism by which the mother communicates to the fetus her sense of time.

1

1
Dr. Clifford Lo uses an automatic injector to fill vials with samples of vitamin D.

2a, 2b
Drs. Reppert (left) and Schwartz proving that mother rats communicate the time of day to their developing fetuses

2a

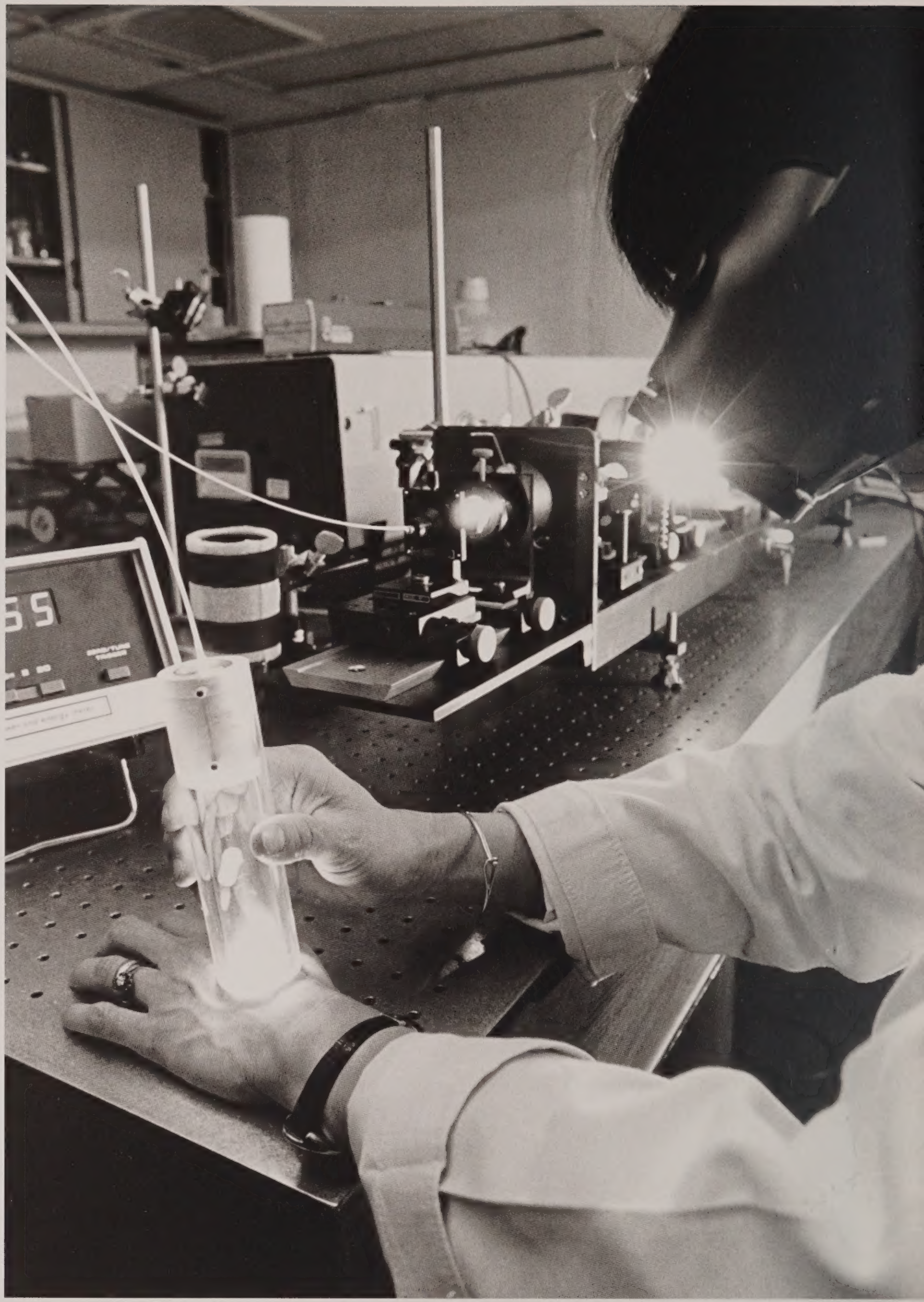
2b

Laser lab

In a time of great general progress in medical science, one of the most fascinating and rapidly growing specialty areas is photomedicine, the medical use of light, including laser light, sometimes in conjunction with drugs. Evidence of the MGH commitment to research in this area is the new laser lab opened this year within the Wellman Research Laboratories of the MGH Department of Dermatology. Dr. John A. Parrish, Director of the Wellman Laboratories, also heads the laser lab, where the research emphasis will be less on immediate medical applications than on basic understanding of the mechanisms of the interaction of human tissue with light.

"Lasers are presently underutilized in medicine," says Dr. Parrish, who also is Professor of Dermatology at Harvard Medical School. "A better understanding of the optical and thermal properties of tissue and a knowledge of the basic mechanisms of laser effects on cells will allow us to use the collective properties of lasers–not just their brightness–to describe a new generation of laser applications which will do more than simply destroy tissue by heat."

By "collective properties" Dr. Parrish refers to the fact that very high intensity is not the only important property of laser light. It is also monochromatic, transmitting on one particular wavelength; coherent, with its electrical and magnetic fields in perfect phase with each other; and it has the ability of variable pulse width in that it can emit light either in a continuous beam or in a pulse as brief as a trillionth of a second. While high intensity allows for highly precise surgical burning, the other properties promise to make the precision still sharper by magnitudes. MGH studies published this year in *Science,* for example, showed that when monochromatic light is tuned to the wavelength at which the target cell is most light-absorptive, and used at a very short pulse, the thermal effects of the laser can be confined to the tiniest structures within tissue. The laser can affect structures within cells, essentially performing microsurgery on millions of cells within the host simultaneously while passing through overlying tissue without affecting it.



A major goal of the MGH laser lab will be to understand how various lasers affect living tissue. Through support from the Wellmans, the lab has already acquired nitrogen, argon, excimer, tunable-dye and ruby lasers, and current plans call for a total of eight instruments. One specific goal is to modify and combine the lasers to alter the cutting or sealing (blood coagulation) properties of the light in order to provide surgical laser systems designed for use in specific organs such as the brain.

The laser lab will be in a large open room of more than a thousand square feet in the Wellman Research Building, where the lasers will be set up on very heavy, air-suspended tables for complete vibration isolation. A small operating room will provide a site for animal tests of new laser surgical procedures.

1b

1a, 1b

With light from a pulsed tunable dye laser directed through a fiberoptic

Getting at the source of pain

Pain killers are a blessing of medicine, but an effective dose often leaves the patient groggy. This is because the drug has to be delivered to the whole system in order to reach the place where it can do some good, as though you had to mail a letter to everyone in the country in order to reach the one person you wanted. If the drug could be delivered closer to the actual site of the pain, then the effective dose would be low enough not to cause unpleasant or harmful side effects.

The possibility of accomplishing this arose several years ago when investigators found that morphine acted not only in the brain but also in the spinal cord. The spinal cord in fact contains a large number of chemical receptors for pain killers such as morphine. These receptors can come decisively into play, for example, when pelvic tumors encroach excruciatingly upon nerves coursing through the pelvis to the lower body.

To treat such distress, two MGH doctors, Charles E. Poletti, a neurosurgeon, and Donald P. Todd, an anesthesiologist, designed two systems which enable patients to administer morphine directly to the lower spine when they feel the need. One system consists of an implanted morphine reservoir containing a four-month supply and a combination valve and pump implanted just under the skin, operable by the patient with finger pressure. In the other system, the patient adminsters the pain killer through a tube (catheter) that protrudes from the skin and leads to the lower spinal cord.

A third implantable system uses a Freon-driven pump to infuse morphine continuously into the spinal cord area (the epidural space) from a reservoir containing a two- or four-week supply of the drug. This system was developed by Dr. Perry J. Blackshear, now of the MGH, and a University of Minnesota team. The United States Food and Drug Administration this year approved use of this method for morphine application. Current trials are assessing the pump's value in delivering other drugs, such as insulin.

As all creatures learn, pain is a varied thing. Understanding it requires various approaches. This is why the past few years at MGH and elsewhere have seen the establishment of several pain units or clinics involving such diverse specialties as neurology, neurosurgery, oral surgery, oncology, anesthesiology, and psychiatry. The clinics are separate because each derives from a separate discipline, but they interact to assure the most thorough patient care. "In the past," says Dr. Poletti, "patients all too often had to consult one specialist after another at considerable expense to find relief from persistent pain."

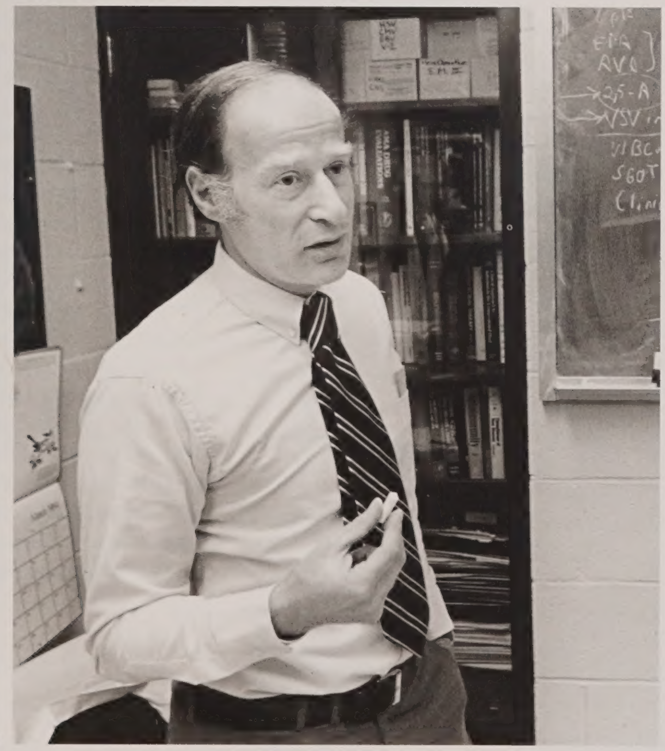
Interferon against CMV infection

About half of the United States adult population has been exposed to cytomegalovirus (CMV), most often without noticeable symptoms. Yet CMV infection is one of the complications most common among kidney transplantation, cancer, and AIDS patients. Its manifestations include a wide variety of diseases such as pneumonia, colitis, hepatitis, and a blood disorder similar to infectious mononucleosis. One of the herpes viruses, CMV has a major impact on pregnancy and is the leading cause of congenital malformation of children. Once CMV has infected someone, it lies dormant in the body and can reactivate itself when the immune system is weakened.

CMV is interesting in transplantation surgery not only because of its role in infection but also because of an apparent involvement in the actual failure of the transplanted organ. The ability to suppress CMV in transplantation patients would thus be doubly advantageous.

A two-year MGH study published in 1983 showed that this may indeed be possible through the use of interferon provided that the interferon is used before an infection develops. Says Dr. Martin S. Hirsch, principal investigator, "This study shows that we can use interferon as a preventive measure and have some impact on clinical CMV infections in patients at particularly high risk." Dr. Hirsch draws a distinction, however, between prevention and treatment. "Other studies," he says, "show that once a patient has an on-going CMV infection, interferon is not likely to be terribly useful. But as a preventive measure in high-risk patients where there is less virus in the body, interferon may well be useful."

There is also a complication with interferon. Interferon is produced in minute amounts by a cell that has been invaded by a virus. The substance is a messenger of warning sent to neighboring cells, and its antiviral properties help them guard against the invading organism. But interferon also stimulates the immune system, and it is the immune system that tries to reject transplanted tissue. The MGH team was able to devise a protocol, however, to circumvent this problem and achieve excellent results. Among the 20 transplant patients who received interferon as part of this study, only one developed symptoms of a CMV infection. In the group of 22 patients who received placebos, or non-medicated substances, CMV symptoms developed in seven individuals.



2

system, Dr. O. Tan (above) and Patrick Mock, Research Engineer, (below) irradiate blood vessels in the skin with minimal damage to the skin surface and to tissues surrounding the vessels. This process is called Selective Photothemolysis.

2

Dr. Martin Hirsch... discussing the protective qualities of interferon

Liver cancer pump

Terminally ill liver cancer victims can add a year to their lives with a new implantable drug pump used by an MGH team headed by Dr. Alfred M. Cohen, Cochief of Surgical Oncology at the MGH Cancer Center and principal author of an article on the new device published this year in the medical journal, *Cancer.*

"The preliminary results have been very encouraging," says Dr. Cohen. Well over a hundred patients have received the pump, and in about four out of every five patients the tumor either shrank or stabilized.

The implantable drug pump overcomes a major obstacle in the treatment of cancer patients: how to give enough of a drug to kill the tumor without harming healthy tissue. "The present treatment of liver cancer with drugs given by vein, particularly cancer that has spread to the liver from the colon, is basically ineffective," says Dr. Cohen. "It is not so much that the drugs aren't good, but that their side effects are so great that the medication cannot be given by vein in high enough doses to be really useful. This system gives high doses of drugs just to the liver, with little to the rest of the body." This method of administering drugs increases their effectiveness a hundredfold.

Colon cancer is the most common malignancy among adults. About 120,000 cases are diagnosed a year, and 40,000 of these will die as a result of the disease. In a third of these fatalities, the spread of the cancer is confined to the liver. The idea of medicating the liver directly through the hepatic artery, which leads to it, is not new, but until recently a battery-operated pump had to be carried outside the body. A totally implanted, refillable drug infusion pump also used experimentally with diabetes (see following story) became available about four years ago, but its placement involved abdominal surgery and a lengthy hospital stay.

In contrast, surgeons implant the MGH pump under the skin of the upper chest and then, by use of a fluoroscope for observation, pass the pump's tubing into the liver. Abdominal surgery is thus avoided. The entire procedure is done under local anesthetic, takes no more than 90 minutes, and requires only a brief hospital stay.

Insulin pump

The MGH opened a new center this year devoted to the development of new methods of treating diabetes. Under the codirection of MGH specialists Dr. Perry J. Blackshear and Dr. David M. Nathan, the Diabetes Research Center is participating in a multicenter National Institutes of Health study of juvenile diabetes. Another study, conducted among patients with adult-onset diabetes, involves the use of a totally implanted insulin pump that Dr. Blackshear helped develop when he was at the University of Minnesota. The new center is seeking volunteers for these and other investigations.

On the track of human LH

The DNA revolution continues to unfold, as evidenced by the following example:

Lutenizing hormone (LH), produced by the pituitary gland, is critical in the regulation of sexual development and reproduction. It controls production of the sex hormones–testosterone in men and estrogen and progesterone in women–and an inadequate supply of it is a cause both of low sperm counts and erratic ovulation. An LH deficit underlies many problems of infertility.

LH is thus a substance of considerable scientific and medical interest. But it has been available in such small and expensive amounts (presently it can only be extracted from the urine of pregnant and postmenopausal women) that both research and application have lagged.

This is why it was good news this year when an MGH team in the Laboratory of Molecular Endocrinology announced the isolation and purification in a test animal of two genes that control the body's production of LH. As explained by principal investigator Dr. William Chin, the pathway to larger-scale availability of human LH still must go through several remaining steps. The genes must now be added to yeast and animal cells to see if they will in fact produce the two components of LH and then to see if these components actually combine to make a biologically active hormone. Then if those steps are all achieved, the whole process must be repeated with the counterpart human genes. But Dr. Chin says confidently, "We have every reason to believe that the hormone will be biologically active."

Mass hysteria

The 224 students of an elementary school in the Boston suburb of Norwood–a middle-class community of about 30,000–had assembled with their teachers in the school auditorium five years ago, some to watch and some to take part in a rehearsal of a play put on by the sixth graders, when a sixth-grade boy, a class leader, grew dizzy and fell from the stage, cutting his chin. The cut was not serious, but the bleeding was profuse. As his teachers came to his aid, several other children, one after the other, began complaining of weakness, dizziness, faintness, nausea, chills, and stomach pains. Bewildered school officials feared some environmental contaminant and called the fire department. The fire department ordered the building evacuated. Rumors of toxic fumes, gas leaks, and food poisonings ran through the group against an eerie background of approaching ambulance and police sirens.

1
Dr. Perry Blackshear with insulin pump he codeveloped

Thirty-four children received medical treatment, most of them on the school lawn; several were hospitalized. Symptoms began to subside, however, as medical personnel were able to assure the children that there was no actual threat and that there was nothing wrong with them. Within four hours of the boy's fall from the stage, the incident was over.

But news accounts caught the attention of two MGH psychiatrists, Dr. Gary W. Small and Dr. Armand M. Nicholi, Jr., who became intrigued with the causes of the outbreak. On the basis of the study which they then undertook, they were able to establish that the Norwood outbreak was characteristic of other reported cases of mass hysteria in that the illness chiefly afflicted girls, was transmitted by sight or sound in the absence of physical causes, and occurred in the context of unusual stress. The stress in this case, an anticipation of loss, was brought on by the announcement a few days earlier that the school's admired and respected principal was about to be transferred.

The psychiatrists' study of the family situations of the Norwood school children (about 80 percent of the school families cooperated in the study) disclosed another theme commonly found in mass hysterias. The 34 children who reported symptoms, as compared to the 190 who did not, tended strongly to have experienced stressful loss –death of a family member, for example, or the divorce of the parents–at an earlier age. A death had occurred in the families of 74 percent of the hospitalized children but in only 39 percent of the others; a divorce had occurred in the homes of 47 percent of the first group but in only 10 percent of the second. Previous research by Dr. Nicholi and others had indicated that a recent loss can reactivate memory of an earlier loss, thus shocking the person with renewed and doubled pain and, evidently, increasing his susceptibility to mass hysteria.

The findings of the Small-Nicholi study were published in the scientific journal, *Archives of General Psychiatry.*

Working women inhibitions

Boys who scored high on academic tasks tended to take credit for their good scores and expected to do better in the future, but high-scoring girls did not. Why not? Why will substantially fewer women than men accept the challenge of public speaking? Why will women more than men credit such success as they may achieve to chance rather than skill? Why can men, as a rule, acknowledge a failure without feeling it is a sign of their inadequacy while women, as a rule, see any failure as evidence of their incompetence? Why do women tend so much more strongly than men to see opportunities for advancement as burdensome, threatening obligations rather than welcome challenges?

These are the sorts of questions that cry out for answers from contemporary clinical psychology, according to Irene P. Stiver, Ph.D., director of psychology at the Massachusetts General Hospital Corporation's McLean (Psychiatric) Hospital in Belmont, Mass. In the meantime Dr. Stiver encourages women to pursue their career interests and to affirm more person-directed qualities.

2

Dr. Jessica Fewkes, a dermatologic surgeon, prepares a tray of instruments for surgery.

2

Cost containment and unreimbursed expenses

Since our medical tradition places an absolute value on human life, our physicians have traditionally enjoyed virtually complete freedom in choosing tests and treatments for their patients. But with a type of cost containment that was pioneered in New Jersey becoming the law in 46 states, this freedom will soon be sharply challenged by harsh economic reality.

Under the New Jersey model, a hospital receives a predetermined amount for admitting a patient with a specific diagnosis, regardless of length of stay or medical options exercised in the individual case. As MGH General Director Dr. J. Robert Buchanan told the staff at a meeting (Medical Grand Rounds) this year, this way of handling health care costs will inevitably force hospitals "to profile the behavior of their physicians" to see which ones prescribe the costly treatments. Bad in itself, this influence could have unusually adverse effects on a referral hospital such as the MGH, which routinely takes on the medically most difficult cases, thus the most expensive ones.

Dr. Buchanan called upon the MGH staff to redouble its efforts at economy as well as medical completeness lest the New Jersey law be imposed in Massachusetts, one of four states currently exempted from DRGs (Diagnosis Related Groups).

The irony is that the MGH reduced patient charges by seven percent last year while at the same time amassing an operating deficit of some $2 million. Calling it the paradox of 1983, Dr. Buchanan explained that due to increased activities the hospital's revenue would have wound up $12 million above budget, but the state disallowed this revenue as exceeding the government's imposed limit. Thus the reduction in charges. The costs of the extra care nevertheless had to be absorbed by the hospital. Thus the deficit.

1

Knight gift

The MGH was the beneficiary this year of a $3 million gift from the Knight Foundation of Akron, Ohio, and Mr. James L. Knight of Miami, Florida. The contribution was made in honor of the foundation's founder, John S. Knight, and his brother, James, who together built a single newspaper into a nationwide communications company consisting today of 33 daily newspapers, four VHF TV stations, 12 suburban papers, and several subsidiary companies.

The contribution provides an entire floor for surgical inpatients as well as a surgical research floor in our new Wellman Research Building. Offering the hospital's gratitude, Dr. J. Robert Buchanan, MGH General Director, noted his special pleasure that the Knight contribution acknowledged "the important partnership between modern patient care and innovative research at the MGH." This relationship is indeed the soul of this hospital.

Cochrane research fund

A husky professional musician whose robust appearance belies his illness, Joe Cochrane has come to us 34 times in the last 13 years, 26 times in a life-threatening crisis, with a condition so rare that only 12 other cases are known in the entire world. It is called Capillary Leak Syndrome. His capillaries–the smallest of his body's blood vessels–occasionally develop leaks. The blood serum in which the red and white cells hang suspended drains into the surrounding muscle tissue. This results in a drop in blood volume that causes the vessels to collapse. Blood pressure becomes undetectable. Shock sets in. Untreated, the condition progresses quickly to death.

This mysterious disease struck Mr. Cochrane at the age of 46. His first attack hospitalized him for three weeks, but he can now be treated and released in a matter of days, owing to protocols developed by the MGH team that cares for him.

To support continuing work on CLS, his brother, Robert Cochrane, and sister, Catherine Cordery, this year established at the MGH the Joseph J. Cochrane Fund for Research on Shock and Capillary Leak Syndrome. This substantial contribution, said his physician, Dr. Newton E. Hyslop, Jr., of the MGH Infectious Disease Unit, "gives formal recognition to a man who has become legendary in his own right in the annals of the MGH."

2

Dr. Baker appointment

Dr. George P. Baker assumed his new position this year as Associate General Director for Medical Affairs, continuing his medical practice as well. An internist, Dr. Baker came to the MGH in 1957 after graduating from Harvard Medical School. He completed his residency in 1962 and joined the active clinical staff. He was made chairman of the hospital's Utilization Review Committee in 1971.

Mary Macdonald

Mary E. Macdonald was appointed Director of the MGH Department of Nursing in 1968, after leaving her post as Associate Dean and Professor of Nursing Education at the University of Massachusetts School of Nursing–Amherst. After a forty-plus-year professional career in nursing education and administration, she has announced her retirement from the directorship–but only to begin, at age 65, the study of law!

Ms. Macdonald assumed her position at the MGH with an administrative mandate to reorganize the structure and operation of the department in the interest of sustaining its avant garde position in the changing health care arena. During her fifteen-year tenure, she emphasized and expanded the tripartite function of the Department–care, teaching, and research. The resulting accomplishments and contributions brought significant recognition at home and abroad. Her recognition of the strategic importance of professional nursing practice in the delivery of health care motivated her continued interest and efforts in the field of basic and continuing nursing education. She played a major role in the inauguration of the Graduate Nursing Program at the MGH Institute of Health Professions.

Of her tenure at MGH, General Director Buchanan said, "Mary Macdonald has championed the recognition of nurses as central, essential collaborators in the provision of expert, compassionate care. Her energy and commitment as well as her wit and good humor will be missed here. Affection, thanks, and blessings to her."

Dr. Myles Baker

Dr. Myles P. Baker died this year at the age of 81. He was remembered in touching words by a former student, Dr. Gordon Scannell, who wrote in the *Harvard Medical Alumni Bulletin,* "Myles set an example of gentle and selfless devotion to patients and to students. We all responded to his manifest friendship, which in my case carried over into a long association at MGH. Ten years ago he wrote in his 50th Harvard report, 'The MGH can and will soon get along without me. I am glad I haven't had to get along without it.' I am grateful," concluded Dr. Scannell, "that *I* didn't have to get along without *him*."

Dr. Jacob Lerman

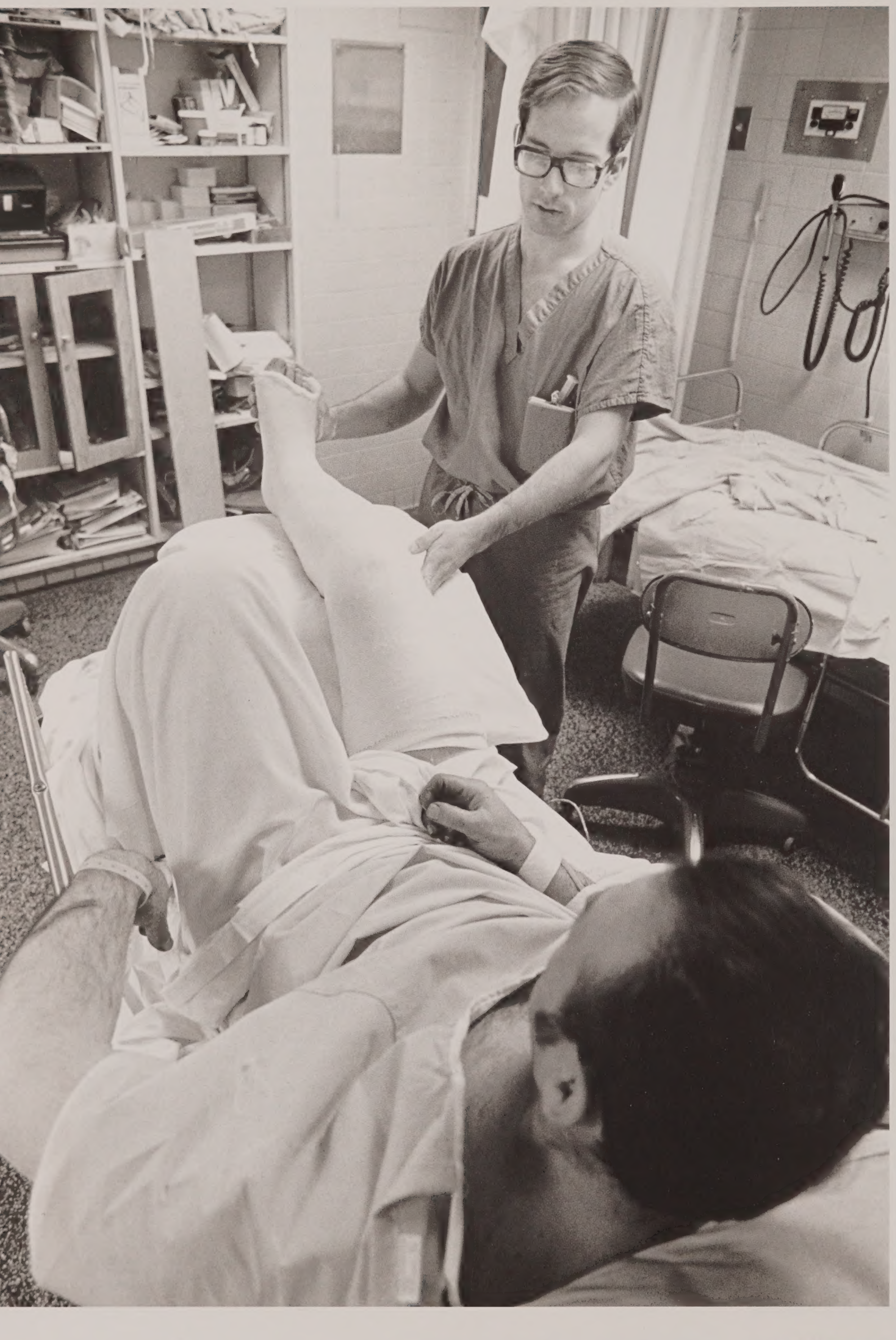
Dr. Jacob Lerman, an MGH senior physician and a nationally recognized authority on the thyroid gland, died this year at the age of 80. Known to his friends and colleagues as "a complete physician," Dr. Lerman was recognized in the 1930s as the first to observe the so-called Means-Lerman Scratch, a cardiac finding in patients with overactive thyroids. His research and writing ranged beyond diseases of the thyroid, however, to include pernicious anemia and certain ailments of the heart. Dr. Lerman received the Distinguished Service Award of the American Thyroid Association.

3

1
Electrician Edward MacInnis taking meter readings

2
Dr. George Baker, newly appointed Associate General Director for Medical Affairs

3
Mary Macdonald at retirement reception



Dr. Keith Osborne

The General Hospital Corporation

Excerpts from audited financial statements

Income	**1983***	**1982***
From patient care	$274,053,487	$263,050,333
Less free care and contractual allowances	30,842,443	33,790,073
	243,211,044	229,260,260
Research and other specific purposes	82,742,377	73,163,299
Indirect cost recoveries	10,626,599	9,557,242
	93,368,976	82,720,541
Other	15,314,798	14,473,193
Total Operating Revenue	351,894,818	326,453,994

Expenditures		
For operating expenses: Salaries and Wages	145,409,900	137,119,072
Supplies, expenses, other charges	122,548,524	119,054,905
	267,958,424	256,173,977
Research and other specific expenses	82,742,377	73,163,299
	350,700,801	329,337,276
Surplus (Loss) from operations	1,194,017	(2,883,282)
Endowment and other income	844,325	3,341,045
Surplus (Loss)	2,038,342	457,763

***Year ending September 30, 1983**

The Hospital's Dollar

Diagnostic and Therapeutic Services: *Diagnostic services, therapeutic services, house staff and professional staff, drugs, supplies, etc.*	50.7%
Nursing Care	16.1%
Plant and Equipment: *Depreciation, interest, energy, telephone, maintenance*	12.1%
Room and Board Services: *Food, Laundry, Security, Housekeeping*	9.0%
Administrative Services: *Computer, Accounting, Administrative salaries, etc.*	12.1%

Massachusetts General Hospital

Facts and Figures

	1982-83
Beds	1,082
Number of Admissions	30,983
Number of Ambulatory Care (Clinic) Visits	556,342
Inpatient Surgery	17,726
Emergency Ward Visits	73,531
Day (Outpatient) Surgery	7,551
Active Staff	1,429
Clinical Fellows	266
Residents	415
Research Fellows	205
RNs	970
LPNs	130
Nursing Assistants	80
Volunteers	906
Employees	8,085

The Massachusetts General Hospital
as of 12.31.83

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The General Hospital Corporation

as of 12.31.83

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Ways of giving

From its founding in 1811 to the present, the Massachusetts General Hospital has been a monument to the generosity of private citizens. The simplest method of giving to the hospital is the gift of cash, but it is also possible to give securities, personal property, real estate, or life insurance. In addition, many companies have matching gift programs that double or even triple the value of a gift given to the MGH.

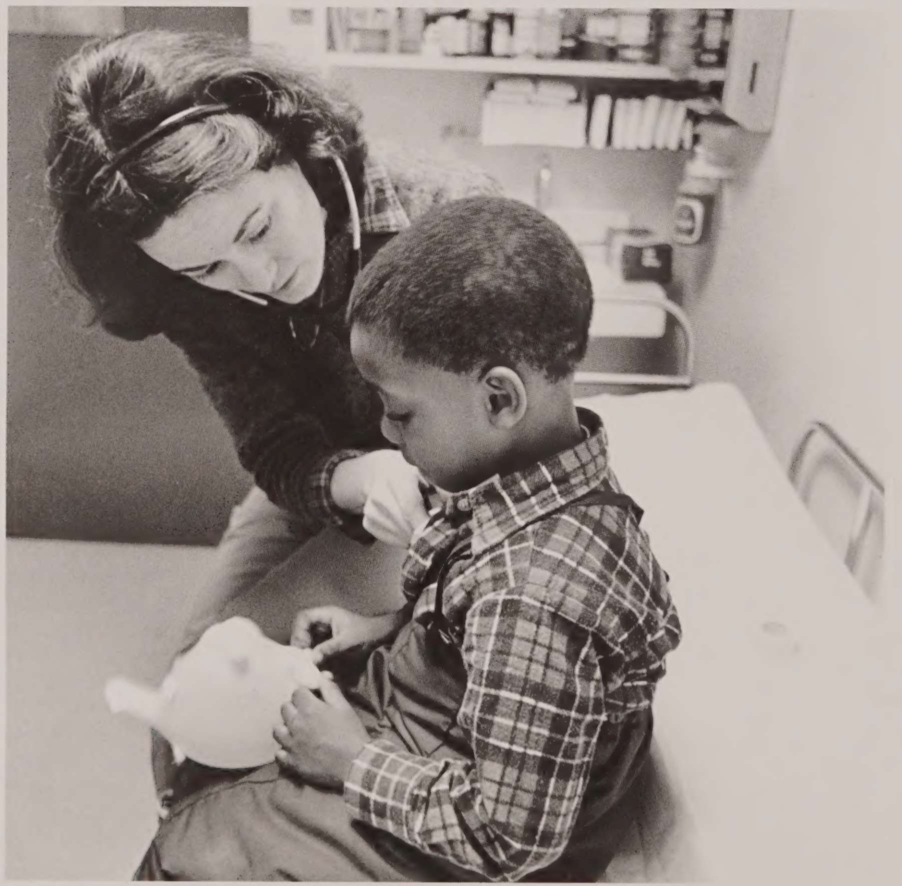
For an individual who has a greater annual income than is needed for current expenses, a *Charitable Lead Trust,* or the contribution of an "income" interest made by a transfer of property into a trust, may be appropriate.

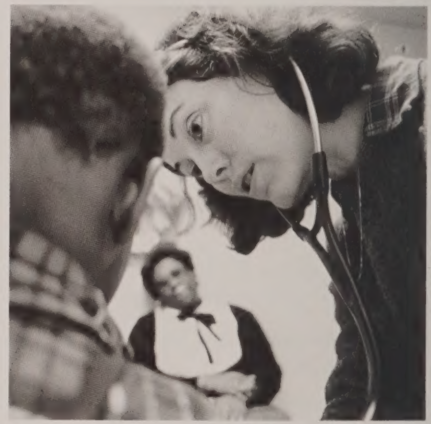
It is also possible to take advantage of the various Life Income Plans offered by the hospital. The *Pooled Income Fund,* for instance, is a trust in which contributions of many donors who have retained life interests are pooled, operating in a fashion similar to a mutual fund. Other life income plans tailored to the specific needs of the donor are available.

Benefaction through bequests has played a vital part in the growth and development of the MGH. Funds may be left in the form of a *cash bequest; a bequest of all or a stated percentage of the residue of an estate, or a bequest of a remainder annuity trust or unitrust.*

Should you plan to include the hospital in your will, or should you be interested in one of the types of gifts described, the hospital could suggest to you or your lawyer specific wording for carrying out your wishes.

Please contact Herbert P. Dane, Director of Capital Campaign (telephone: [617] 726-2200), with any questions regarding your gift to the MGH.





Dr. Patricia O'Malley, Director of Pediatric Emergency Service

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Massachusetts General Hospital

Annual Report 1984

2 Chairman of the Board

4 Crushing kidney stones

5 Magnetic resonance imaging —a new look inside the body

6 New Burn Center

6 Liver transplants

8 Pediatric Respiratory Specialties Clinic

9 Pediatric Rehabilitation Unit

10 MGH Cancer Center

11 Day Treatment Center for dermatology

11 New addition—Spaulding Rehabilitation Hospital

12 Family care and elderly long-term care

12 A new building for Revere Health Associates

13 Wellman Research Building —a reality

14 M.A.'s —Detecting liver cell cancer

14 M.A.'s —A test for hepatitis B

15 A marker for Huntington's disease

16 Using intensive care

16 Locating deep-vein blood clots

17 Exercise —cooling down

18 Free tissue transfer

19 Facial pain

19 Growing skin

20 Predicting the Nobel prize

20 A new treatment for precocious puberty

21 Treadwell Library —125 years young

21 Montague Genetics Library

22 First Ruth Sleeper Scholarship

23 Fifty years of clinical pastoral education

23 2500 years old, and he never looked better

24 Twenty-five years at the MGH

24 First women associate general directors

25 Eleanor Clark

25 Ann Barnes

26 Richard Talamo lectureship

26 Treating Olympic athletes

Chairman of the Board

One hundred seventy-three is an odd number, not a usual milestone, and perhaps it will be considered eccentric to have a sense of history pervade our thoughts as we examine the events of 1984 at the MGH. Surely, however, an event of deep historical significance was this year's refurbishing for exhibition of our oldest friend, Padihershef, the mummified Theban stonecutter of 2500 or so years ago who has for most of the past 161 years presided over events in our Ether Dome (p. 23). In addition, this year marked the publication of another volume in our ongoing history (p. 24). It has not made the best-seller lists but makes fascinating reading. Great credit is due the authors, particularly David C. Crockett.

Reflections on the past invite comparison of times past with the present and reinforce our conviction that we are indeed living in a time when the field of health care is undergoing rapid, unprecedented, and often painful change, hopefully of a constructive nature in the long run but disruptive and divisive as required adjustments are made.

Changes are pervasive throughout the MGH, manifesting themselves everywhere we look. Our staff is taking a leadership role in the extraordinary acceleration of progress in medical science and technology. Less spectacular but extremely important also is the continuing struggle of the administration, with the very essential help of the staff and employees, to contain and control the increasing costs of health care delivery.

This year also marked the opening of our Burn Center with its bacteria-controlled nursing units, which allow for new effectiveness and efficiency in the care of severe burns (p. 6), providing care for burned adults on a par with that provided for children by our affiliate, the Shriners Burns Institute, a center which, thanks to the quality of its staff and to the continued generosity of the Shriners, for which we are all deeply grateful, is a world leader in its field.

A very important milestone this year was our acquisition of the Spaulding Rehabilitation Hospital, an institution with a deserved reputation for highest quality patient care, thus enabling us to extend our facilities for care to those well enough to leave a hospital like the MGH but still in need of rehabilitation (p. 11).

As stated above, we are faced with the necessity of intensifying our struggle to keep the hospital on its traditional, sound financial base. When the MGH was founded as the teaching hospital of Harvard Medical School early in the 19th century, constructing the Bulfinch Building cost $140,000—an edifice, by the way, which still stands because it still must serve. Today, that amount would not even cover our costs of operation for half a day.

As this fiscal year drew to a close, the hospital resoundingly reaffirmed its resolve to meet the greatest challenge facing the MGH in this decade—to modernize entirely our inpatient facilities. On September 25, nearly 600 MGH Corporation members, Trustees, medical staff, volunteers, friends, and supporters launched Phase II of The Capital Campaign with more than $77 million pledged toward a revised total goal of $169 million.

A milestone pledge by Dr. and Mrs. An Wang of Wang Laboratories, Lowell, led the new gifts and pledges which have accrued since

Phase I of the Campaign ended in December 1983. The Wangs' $4-million commitment to the MGH was designated to complete funding of the Ambulatory Care Center, which will be named in their honor in ceremonies this spring.

Phase I, in healthily surpassing its interim goal of $65 million, saw the construction and dedication of the Wellman Research Building, the completion of financing for the MGH Cancer Center, and the beginning of a program of renovations which will bring those obsolescent rooms containing approximately 420 beds up to modern medical standards. First of these facilities to be placed in service was the MGH Burn Center, which opened on Bigelow 12 in May. Within a very short time, all MGH inpatient rooms now located in facilities which can be economically redone will provide accommodations equal to the care offered by our skilled staff.

More than half the MGH's inpatient rooms, however, are in buildings which defy efficient renovation. Consequently, the second phase of the Campaign, lasting through the '80s, concentrates most strongly on new construction. Phase II designates $84.8 million toward a new inpatient tower. During this past year both the Boston Redevelopment Authority and the Boston Zoning Commission have given unanimous approval to our proposal. In the coming year we will begin the process of developing concrete building plans with the state Department of Public Health.

In addition to inpatient facilities, Phase II also addresses other patient care needs. We seek $6.2 million for trauma facilities, $5 million for a cardiac catheterization laboratory, and $2 million for an intraoperative radiation suite. The Campaign also identifies $6 million in faculty and scholarship endowment for the MGH Institute of Health Professions.

The monies generated to date toward The Capital Campaign make it clear that the MGH's need is evoking both broad-based and in-depth support. I am confident in predicting that 1984 calendar-year totals will exceed $14 million, making this the hospital's second-largest fund-raising year ever—surpassed only by 1981, when Arthur O. and Gullan M. Wellman announced their record $15-million pledge. Leading the way this fiscal year were members of the MGH cardiac, orthopedic, and surgical services, who so far have pledged more than $2.6 million to the Campaign. With the medical solicitation just under way, doctors had already pledged over $3.2 million. Other supporters with long associations with the hospital were counted, too, including the Ladies Visiting Committee, which pledged $250,000.

Moreover, this year has seen 16 donors in our major-gifts category of $100,000 or more who, like the Wangs, are answering the challenge to maintain the MGH at the forefront of modern medicine. Among them are Miss Anne Tarbox of Maine, the Marie G. Dennett Foundation, and Boston Edison Company.

We are heartened by this outpouring. Private philanthropy has historically been the cornerstone of the MGH, and the response of the community to this Campaign clearly will continue to shape our future.

In fact, it is not too much to say that only through the ongoing interest and financial support of private citizens can the MGH make way against a difficult tide, advancing its excellence in care, research, and teaching.

At the McLean Hospital our Psychiatrist-in-Chief, Dr. Shervert Frazier, resigned effective December 1 to accept the distinguished position of Director of the National Institute of Mental Health. Dr. Alan F. Schatzberg has been appointed Interim Psychiatrist-in-Chief and Dr. Jack H. Mendelson, Acting Chief of Harvard's Department of Psychiatry at McLean.

The occupancy rate remains high, the institution continues to enjoy an excellent reputation in the community and in the world, and its financial position continues strong, although major renovations to the physical plant are both desirable and necessary. The McLean Long-Range Planning Committee continues its deliberations with respect to the future of the institution and, it is hoped, will present a significant recommendation to the Trustees sometime during 1985.

Francis H Burr

Francis H. Burr, Esq.

4

Crushing kidney stones

"Stone crusher" is what its name means in classical Greek, and it arrived at the MGH from Germany in 25 crates weighing a total of seven tons and costing about $1.3 million. The MGH lithotripter is one of six such machines approved by the Food and Drug Administration for U.S. testing in the treatment of kidney stones, a painful and difficult-to-treat malady that afflicts five to six million Americans, most of them men between the ages of 40 and 50, and sends 100,000 of them a year to the operating room. The imposing new machine needed a special room within a room at the MGH, not only because its great weight required extra support but also because in operation it produces a sharp explosive sound that would be bothersome unless muted. But the lithotripter is worth all the expense and trouble because of the dramatic breakthrough it brings in the relief of one of mankind's most difficult, painful, and common illnesses.

Formerly resigned to undergoing surgery, many kidney stone patients now obtain relief by means of a less painful, less costly, and less disruptive treatment with a lithotripter.

The typical kidney stone is formed when, for reasons still not clear, the kidney excretes too much calcium and too little water. This condition allows calcium crystals to form and adhere to one another. The majority of these stones are small enough to be passed with no medical problem. But the larger ones cause excruciating pain, and their removal—until the advent of the stone crusher—has always necessitated major surgery.

The "extracorporeal shock-wave lithotripter," to call it by its formal name, is designed and built by Germany's Dornier System along with Dr. Christian Chaussy of the University of Munich. It works by bombarding the stone with high-pressure acoustic shock waves generated outside the body by a sparking electrode device, the patient being immersed in a seven- by four-foot tub of water while lying on a hydraulically operated stretcher. An X-ray-based system locates the stone, displays its exact position at the control panel, and thus allows the physician to position the stone precisely at the focal point of the shock wave. After repeated shocks spaced over a 60- to 90-minute period, the stone crumbles into tiny particles which the patient then can pass.

Far less painful than conventional surgery, the new treatment will also significantly lower medical bills and radically curtail the time the kidney-stone patient must spend off the job. Indeed, many lithotripter patients in the future may be served as outpatients, resuming their normal activities within a day or two of treatment.

Says Dr. Stephen P. Dretler, the MGH urologist carrying out the MGH lithotripter trials, "There have been significant improvements in treating stone disease in the last several years, but all others have involved surgery of some kind. This treatment is a breakthrough of historic proportions."

Dr. Thomas Brady with magnetic resonance images that aid the diagnostician

Magnetic resonance imaging–a new look inside the body

The technological explosion in diagnostics that dates from discovery of X rays in 1895 centers today on an utterly futuristic machine called the magnetic resonance imager.

As with X rays or computed tomography (CT) scanning, magnetic resonance imaging–MRI–provides a visual representation of the patient's internal anatomy. But MRI, formerly known as NMR, also provides additional information on the biophysical and biochemical state of internal tissue, making it possible to distinguish with great precision between the various states of disease within the body–and all without invading the body in any respect, neither surgically nor with radiation nor with swallowed medications, and without causing the least pain.

The MRI device employs a large doughnut-shaped magnet with a magnetic field many times stronger than the earth's. When the patient lies within this magnet, the force of its field aligns the body's protons in a uniform way, much as though they were iron filings. A brief radio pulse is then emitted, tuned to the resonant frequency of the protons in the body's hydrogen atoms. This causes them to act all together and rotate or wobble (precess) like a spinning top–imagine billions and billions of tops wobbling in perfect synchrony. As they relax back into their induced magnetic alignment, they emit detectable signals of their own, and these signals are characteristic of the body tissue they come from.

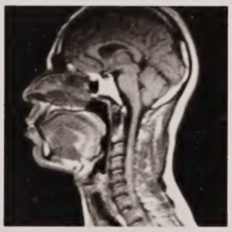
This is the basic principle that allows the magnetic resonance imager to represent on real-time video display a detailed cross-sectional or three-dimensional image of the internal anatomy without medical preparation or radiation of any kind. Except for patients with implants, whose metal components could be affected by the device's strong magnet, MRI so far appears to be risk-free.

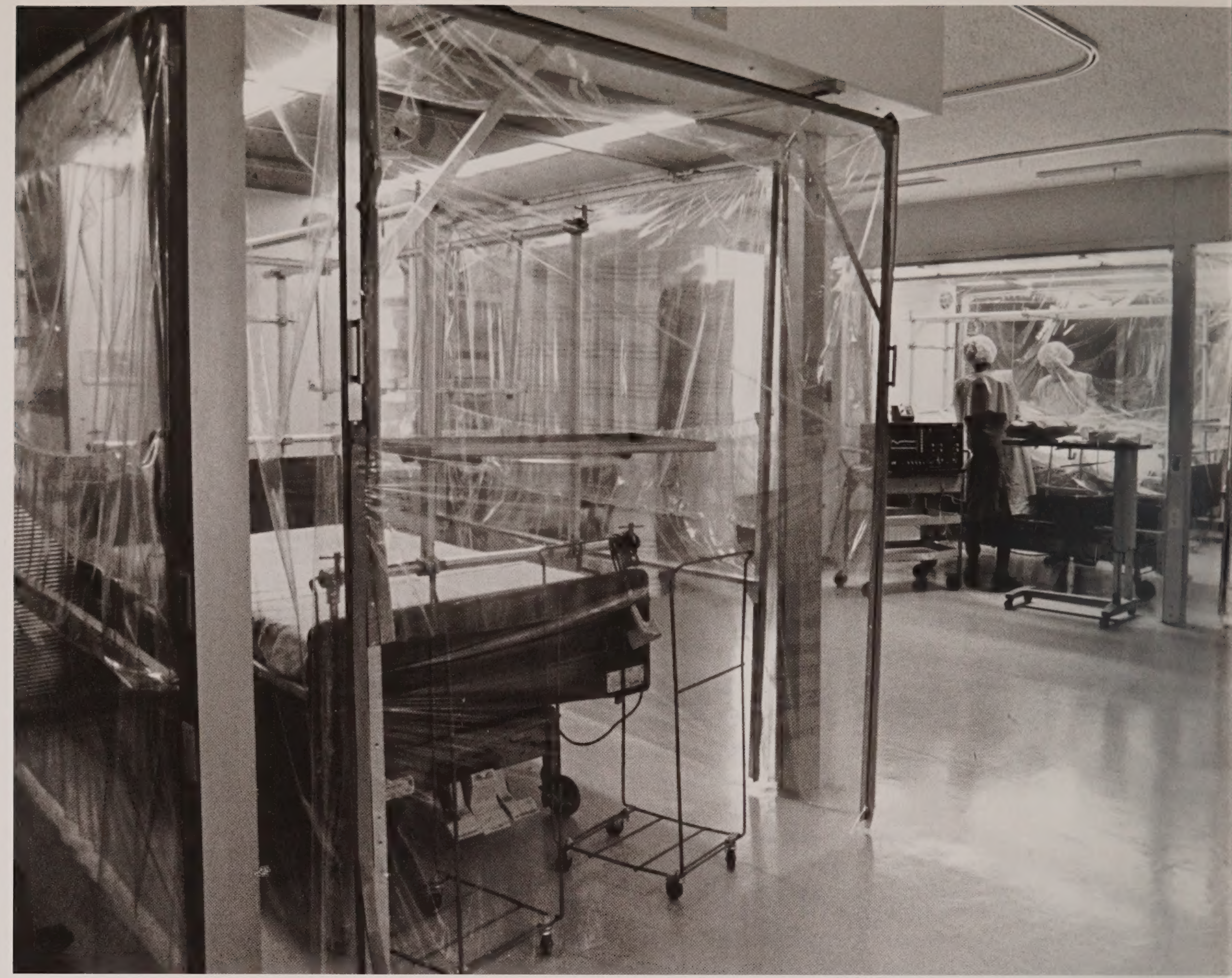
Beyond its apparent safety, however, there is another great advantage to MR imaging–the technique's ability to distinguish between various tissue states at a very subtle level of difference. This may mean, for example, that assessments of medication that currently require months can be made in weeks or days. Says Dr. Thomas J. Brady, Director of MRI at the MGH, "Because MR imaging and spectroscopy give us more metabolic information, we may be able to evaluate therapy more effectively than ever before."

The day is indeed foreseeable when MR soundings of the body, taken at various chemical frequencies besides the hydrogen frequency used so far, will provide physicians with a full metabolic report without so much as a blood test.

MR work was begun at the MGH in 1979 in partnership with the Johnson & Johnson Company's Technicare Corporation which financed the MR spectrometer and built the imager that MGH scientists helped develop.

Magnetic resonance imaging provides another window through which to see an important view of the inside of the human body and how it works.





New Burn Center

The first burn care center in New England designed specifically for adults was opened this year by the MGH, replacing our obsolete 10-bed unit with one of the same size, but including the most modern burn care innovations, such as the bacteria-controlled nursing units (BCNUs) which provide us with much greater ability to prevent infections. The new center is designed to make the most effective and efficient use of medical care time.

Many of these innovations—the BCNUs, for example—were originally developed in an earlier form by Dr. John F. Burke, Chief of Trauma Services and head of the new burn center, and pioneered at the Shriners Burns Institute, an affiliate of the MGH. Traditional burn care isolates patients in separate rooms to prevent cross infection, which is often devastating to a burn patient. "This kind of separation is a reasonably effective method," says Dr. Burke, "but it is inefficient for doctors and nurses and expensive for the patient."

In the new system, the center achieves separation through the use of six- by eight-foot plastic cubicles suspended around the bed, closed on floor and ceiling, and ventilated with a unidirectional flow of bacteria-free air to ensure a virtually bacteria-free environment. There is a special access door, but attendants can perform tasks through gloved armports on both sides of the unit.

Dr. Burke has also developed a special bed for those patients too severely burned to help the nurse in turning them. Hydraulic controls allow one person to change a sheet even when a heavy patient is attached to critical care devices. A prototype of this bed is now being tested in the new center.

The new facility has other special features, such as a classroom with a window onto the ICU, private family counseling space, and a speedy method of moving 4,000 blood gas samples a year to the lab and back. Says Dr. Burke, "We finally have the physical setting to complement the skills of very dedicated, compassionate caretakers."

Liver Transplants

MGH joined this year with three other area teaching hospitals to form the Boston Center for Liver Transplantation, the first jointly operated center of its kind in the United States. MGH combined forces with the Children's Hospital, the New England Deaconess Hospital, and the New England Medical Center to create the new facility because of the compelling need for such a program. The New England area is a six-state region in which there may be as many as 50 to 100 liver transplantation candidates each year, about 30 percent of them children.

The last MGH transplant patient before the opening of the new center, for example, was 17 year-old Kim Wood, who at the time was also the youngest person who had received a transplant in our state to survive a

Special nursing units assure a bacteria-free environment for critically burned patients.

liver transplantation. Kim's surgeon, Dr. A. Benedict Cosimi, Chief of MGH Clinical Transplant Surgery, together with Dr. Frank Delmonico, went to Indianapolis to remove the liver from a donor while Kim was in an MGH operating room with Drs. Paul S. Russell and Patricia K. Donahoe. They had freed the girl's diseased liver so that it could be replaced by the donated one as soon as it arrived that night at the MGH.

Removing the liver from the donor is in itself a delicate procedure requiring about three hours, and the free organ can survive in a useable state for only 8 to 10 hours. The transplantation procedure is even more grueling, requiring an average of 12 hours and running as long as 20. This is because unlike a transplanted heart, for example, a liver must be connected to a great many arteries and because surgeons must reconstruct the drainage system for bile, which the liver sends to the intestines to aid in the absorption of fat.

"Liver transplants," says Dr. Cosimi, "are among the most physically demanding and complex operations from the doctor's standpoint. There are more tedious procedures—microscopic brain surgery, for example. But removing a patient's diseased liver and attaching the new organ, which must immediately provide so many critical functions, requires incredible cooperative effort from multiple teams of doctors and nurses."

Much more difficult than Kim Wood's case was that of Michael Kolatka, the MGH's first successful liver-transplant patient. Mr. Kolatka, 33, had suffered since childhood from a liver-scarring disease of unknown cause. For three months before coming to the MGH he had been in and out of a coma; he was on antibiotics for treatment of infection, and he had hepatitis.

Predictably, his postoperative course was difficult, entailing two subsequent operations, many blood transfusions, and several episodes of rejection of the new organ. His kidneys also failed, making kidney dialysis necessary for a time. But now, one year after his transplant, the Peabody man is back at work as an interior decorator.

The cases of Kim Wood and Michael Kolatka define the two extremes of liver transplantation. Kim was in real danger, but her overall health was good apart from her liver problem. Her operation required only nine hours and 14 units of blood; she was out of the ICU in just three days and back home in three weeks. Mr. Kolatka, on the other hand, already weak from his long struggle when the operation began, was in the OR for 14 hours and required 66 units of blood, almost twice the average. A more recent MGH patient received a liver transplant in an operation in which only four transfusions were required.

Both Kim Wood's and Michael Kolatka's operations required special permission from the Commonwealth of Massachusetts. With the four-hospital Boston liver consortium now established, emergency surgery such as Mr. Kolatka's has become less common allowing the survival rates and postoperative recovery times to steadily improve.

Five months after a liver transplant saved her life, a healthy Kim Wood stepped onto a stage to receive her high school diploma.

Pediatric Respiratory Specialties Clinic

A young man of 17 arrived four years ago in our pediatric pulmonary unit so sick he could have died any day. He had been advised by other doctors, including a cardiologist, that his problem was incurable. Simply put, his lungs were unable to take enough oxygen from the air. During exercise tests in which the healthy lung increases by tenfold its capacity to take up oxygen, this young man's lung only doubled its uptake. He could walk only 100 feet before having to rest.

His physician, Dr. Daniel C. Shannon, Chief of the MGH Pediatric Pulmonary Unit, diagnosed a case of primary pulmonary hypertension—a form of high blood pressure that almost invariably kills within three years.

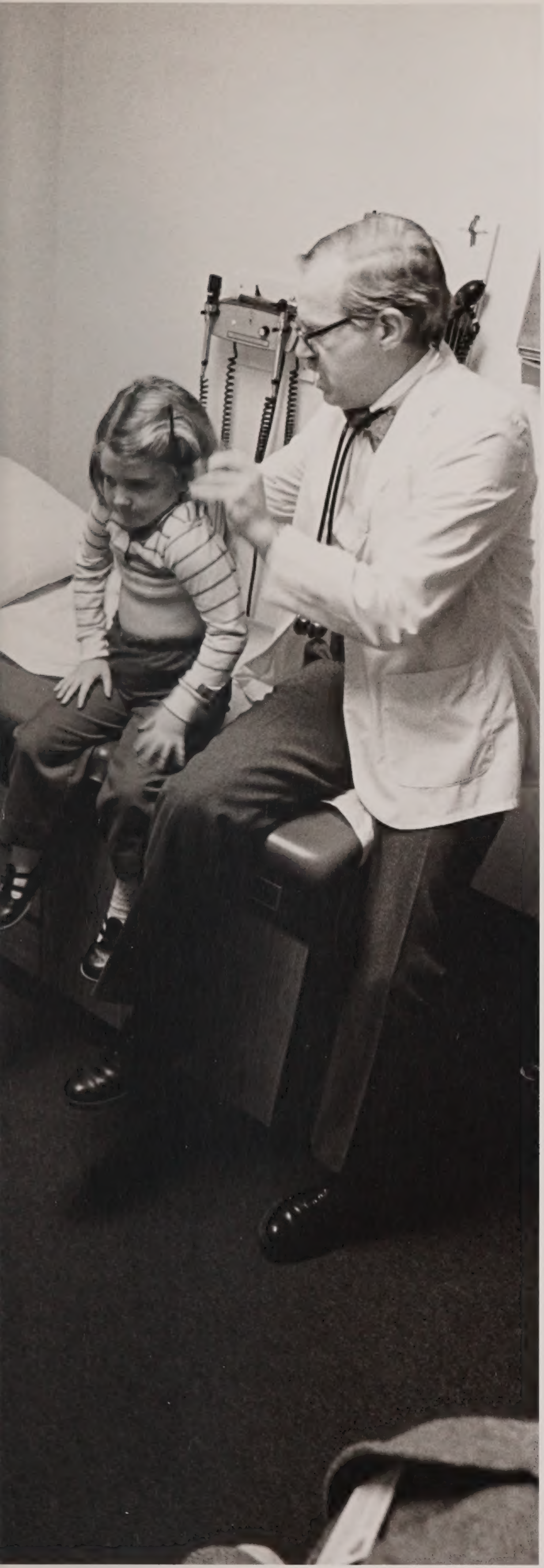
Dr. Shannon consulted with specialists in cardiology, radiology, and angiography (blood-vessel X ray). "We feared the teen-ager would die if we didn't do something," says Dr. Shannon. "We tried a number of drugs, and one worked. Its use had been reported only once before." The young man continues his treatment as an outpatient, living an otherwise normal life. His oxygen uptake now increases eightfold with extreme exertion and allows him to hold down a full-time job requiring physical labor.

This remarkable recovery shows the importance of medical specialization and of considering innovative treatment in seemingly hopeless situations.

Also demonstrated is the importance of regular consultation among specialists. Without specialists, a treatment might not be known. Without consultation, the innovation might not find its way to its full range of patient applications.

Specialization and routine consultation are thus built-in features with the pediatric unit's new Respiratory Specialties Clinic, which centralizes care for children with a variety of breathing disorders such as cystic fibrosis, asthma, recurrent pneumonia, and sleeptime breath irregularities, or apnea. Each staff member of the new clinic has a special pediatric interest, and all of them confer at length about every patient, regardless of the problem. Weekly conferences include pediatric pulmonary specialists from Children's Hospital and New England Medical Center as well as visitors from around the world.

Pooling their skills, Drs. Ellen Weiss, Allen Lapey, and Daniel Shannon seek the cause of a child's recurrent bronchitis.



Producing a medicated mist, this device often assists in the home care of patients with severe asthma.

A test to determine breathing capacity of the lungs

Pediatric Rehabilitation Unit

Another new center for interdisciplinary medicine at the MGH is the Edwin Phillips Trust Rehabilitation Unit now operating on Burnham 4, one of the hospital's principal pediatric areas. The Phillips Trust is dedicated to helping disabled children—a group which grows every year because medicine increasingly can save the lives of children whose severe injury or disease would formerly have killed them. The new center's staff brings together specialists in pediatric nursing, neurology, orthopedics, and physical therapy and (when appropriate) social service and diet.

"We're simply getting the recovery effort started earlier," says Dr. Donald N. Medearis, Jr., Chief of the MGH Children's Service. "We think that this early push coupled with a highly coordinated type of treatment involving a number of specialties offers hope of ultimately shortening a patient's care while also brightening his chances for the future."

Listening to lungs at work

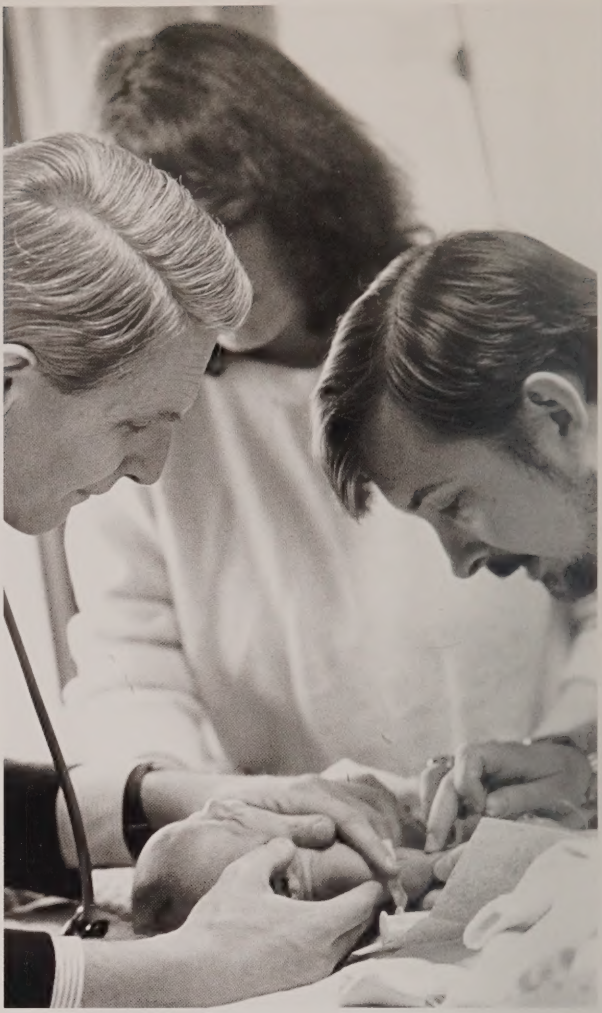
In the Pediatric Hematology-Oncology Unit, Nurse Practitioner Susan Thompson, above, examines a young leukemia patient while, at right Drs. John Truman and William Ferguson tend an infant who has hemolytic anemia.

MGH Cancer Center

The concept of a multidisciplinary approach to cancer goes back to 1925 when the MGH opened the nation's first general-hospital tumor clinic for certain cancers. Fifty years later we built the Cox Building to house our ambulatory cancer care facilities and serve as a focal point for cancer treatment, teaching, and research going on throughout the hospital.

Today the MGH Cancer Center is the largest clinical cancer facility in New England. The radiation therapy program is second only to the M. D. Anderson Tumor Institute of Houston in number of treatments given annually. For the MGH this totaled 46,345 in 1982–83; this number does not include treatments given by MGH staff at the Harvard Cyclotron Laboratory and other radiation centers around Boston.

Medical, surgical, and radiation cancer specialists work together in the MGH Cancer Center to make sure that each patient's treatment program is the best possible combination of approaches. *Intraoperative radiation therapy*, for example, which MGH physicians helped pioneer, combines the power of the surgeon with the powers of the radiation therapist. "It has been particularly important," says Dr. William C. Wood, Medical Director of the Center, "in treating advanced tumors of the rectum and the pancreas. We expect the procedure will be applied to a variety of cancers."



Another technique developed in part at the MGH is the *implantation of drug pumps* to administer a drug directly to the tumor rather than systemically or intravenously. This technique combines surgery and chemotherapy in a unique and often dramatically effective way. Dr. Alfred M. Cohen, cochief with Dr. Wood of the surgical oncology unit, reports that he and his staff have implanted in more than 150 patients pumps capable of delivering a combination of three drugs directly to the liver. "Because of the trial nature of this treatment," says Dr. Cohen, "we've limited ourselves to patients with advanced liver cancers. But in a large majority of these individuals, we've been able to achieve either regression or stabilization of the tumor, extending both the quantity and quality of life."

Another kind of innovation, introduced in 1971 by the Chief of the MGH Orthopaedic Service, Dr. Henry J. Mankin, is *transplantation of donated bone* to combat bone cancer. Dr. Mankin and his colleagues have performed 270 bone transplantations since 1971 with an overall success rate of better than 80 percent. This achievement has been made possible essentially because of techniques developed by Dr. Mankin and his staff for preserving the viability of donor-bone cartilage during storage.

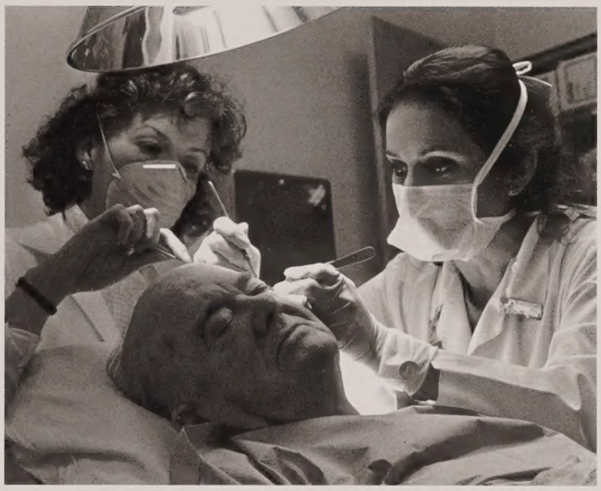
The MGH Cancer Center has recently inaugurated a monthly grand rounds, as Dr. Wood explains, because "there are so many different groups carrying out cancer studies at the MGH." The interplay of new ideas that results from this is the breeding ground of breakthroughs to come.

Day Treatment Center for dermatology

The Dermatology Ambulatory Care Unit, besides providing the usual outpatient care, has developed a Day Treatment Center to treat patients with more extensive or complicated diseases that otherwise would have required hospitalization. Under the supervision of a physician, two trained nurses provide complex or time-consuming outpatient procedures based on protocols established for inpatients. This intermediate or extended care facility has significantly reduced hospitalization time for several dermatologic patients who previously had to be treated as inpatients.

Another component of the Dermatology Ambulatory Care Unit is the Dermatologic Surgery Unit, opened in 1983, which carries out a wide range of procedures. Chief among them is surgery in which a microscope is used to help determine the precise extent of cancerous lesions. Dr. Jessica L. Fewkes, who directs the unit, was trained at Duke University in the technique developed by Dr. Frederick Mohs of the University of Wisconsin. "The Mohs technique," says Dr. Fewkes, "enables us to view microscopically where the tumor is spreading. We sacrifice the least amount of normal tissue and enjoy the highest cure rate possible, especially for large, recurrent tumors."

Expansion of its ambulatory services allows the MGH Dermatology Department to offer patients highy specialized care in a form convenient and economically favorable to them.



Dr. Jessica Fewkes, right, and Kathleen O'Toole-Davis, RN, remove a patient's skin cancer in the ambulatory Dermatologic Surgery Unit.

New addition — Spaulding Rehabilitation Hospital

The MGH this year acquired the highly regarded Spaulding Rehabilitation Hospital, a 284-bed facility near the MGH which provides rehabilitation care in a variety of areas — 30 percent of it to MGH referrals.

"The purchase of the SRH preserves for the General a vital resource for the rehabilitation of MGH patients," said MGH Board Chairman Francis H. Burr. "The acquisition will broaden MGH's involvement in a whole range of rehabilitative services."

Lawrence E. Martin, MGH Associate General Director, serves as Chairman of the Board of SRH and Dr. J. Robert Buchanan, MGH General Director, as President.

The SRH, affiliated with Harvard Medical School and Tufts School of Medicine, is a modern, self-sustaining facility.

Outpatients from afar or the families of inpatients often need overnight accommodations in Boston, and for their convenience the MGH is now renting 17 units in the newly renovated Beacon House, a landmark residential hotel gutted by fire four years ago and since rebuilt. Information on these units is available from the hospital's Social Service Department.

The MGH is helping to erase Revere's image as a medically underserved community.

Family care and elderly long-term care

As advances in health care prolong life and changes in life-style lower the birth rate, our nation becomes increasingly older—the number of people over 75 especially is ballooning, and every week 210 Americans celebrate their 100th birthday.

This long-term transformation of our demographic character imposes new demands on acute care hospitals such as the MGH, which often find they must keep elderly inpatients longer than medically necessary because of the difficulty of finding appropriate post-acute care.

As a step toward meeting these needs, the Robert Wood Johnson Foundation has awarded grants to 25 hospitals throughout the United States to develop comprehensive programs for elderly care. The MGH grant of $650,000 will support a long-term-care pilot program in which an MGH team of social workers, nurses, and physicians will manage the ongoing health needs of elderly patients at risk, developing alternatives to costly hospital and nursing-home care.

"One of our goals is to prevent crises," said Eleanor Clark, M.S.W., who was Director of the MGH Social Service Department when she conceived of this innovative program to return elderly patients to their communities with appropriate services. "We believe that a proactive, rather than reactive, team of very observant professionals can help the patient take care of symptoms before a crisis occurs and hospitalization becomes necessary."

During the three years of the pilot project, the MGH team will follow 250 elderly patients, all judged to be at high risk, from three of the local communities where the MGH maintains neighborhood health centers—Chelsea, Revere, and Charlestown. The aims will be to improve the patients' functional independence and quality of life, whether in homes or care facilities, and to reduce to a minimum the medically unnecessary days the patients remain in acute care hospitals.

The MGH study has gotten off to a good start even though suffering a devastating loss—the death on September 18, 1984, of Miss Clark.

A new building for Revere Health Associates

MGH acquired the financially troubled health center in Revere in 1981 as an opportunity to offer top quality health care to a city classified by the federal government as medically underserved and as part of our commitment to community medicine. The Revere satellite is the hospital's fourth neighborhood center, the others being in Charlestown, Chelsea, and at Logan International Airport. These centers have established their effectiveness in making the resources of the hospital easily accessible to the community.

This year the Revere center moved into new permanent quarters in the Revere post office building. The center's staff now includes specialists in internal medicine, pediatrics, obstetrics, gynecology, podiatry, nutrition, and social service. Handling about 14,000 visits a year, the center is open from 8:30 a.m. to 5 p.m. to meet its special commitment to the community.

Specialized care is offered at MGH-Revere Health Associates for patients of all ages.

Wellman Research Building—a reality

The MGH maintains the largest hospital-based research program in the United States. It has been a leader in the development of American medical science from earliest 19th century beginnings, but the volume of its research activities long ago outstripped its available laboratory space.

What has changed things is completion of the Wellman Research Building. Made possible by the generosity of Arthur O. and Gullan M. Wellman of Florida, formerly of Brookline, Massachusetts, who pledged $15 million to the project in 1981, the Wellman Building provides MGH researchers with a laboratory facility fully worthy of their needs. The Wellman includes, for example, the world's largest medical laser research lab, created with an additional $1.7 million donation by the Wellmans. The laser lab will be the base of MGH's major program in photomedicine, the application of light to medical care.

Generous funding by Hoechst AG and by the Howard Hughes Medical Institute and contributions from the Thomas Anthony Pappas Foundation, the Hinduja Trust of India, and the Knight family and the Knight Foundation established a variety of laboratories in the 13-level, 150,000-square-foot building. The laboratories will house MGH's innovative studies in plant and animal genetics, the neurosciences, metabolism, and the phenomena of aging, growth and development.

"The MGH is a flagship of contemporary medicine," said Dr. J. Robert Buchanan, MGH General Director.

"Throughout the hospital's history, research conducted here has led to dramatic breakthroughs in patient care. The addition of the Wellman Research Building, with its opportunities for collaborative research in a variety of disciplines, ensures that the MGH will continue its tradition as a leader on the frontier of medical science."

WELLMAN RESEARCH BUILDING

The Wellman Building: reaching out to expand avenues of scientific study

Drs. Jack Wands, left, and Dominique Bellet, whose collaborative efforts led to an early way to detect a common form of cancer

M.A.'s

The new science of monoclonal antibodies (M.A.'s) continues to emerge as one of contemporary medicine's most powerful diagnostic and research tools. Under development only since 1975, monoclonals are biologically engineered entities designed to interact with—and *only* with—specific molecular targets in the body. The ability to synthesize such entities makes much new medicine possible, as demonstrated by two new advances this year at the MGH.

Early detection of primary liver cell cancer: Primary liver cell cancer has been uncommon in the United States, but worldwide it is a signifiicant health problem. It appears to develop in those who have been infected early in life by the hepatitis B virus and become chronic carriers of the virus. This group is largely Asian and African. Studies indicate that as many as 20 percent of the people of China and Taiwan are chronic hepatitis B carriers, along with about 10 percent of Japanese and Koreans and five to seven percent of Middle Easterners. In contrast, only one tenth of one percent of the people of Europe and the United States have been exposed.

But mysteriously, here and there in the West, there are serious rises in the rate of liver cancer. During the past decade, for example, this rate has tripled in California; it is strangely high in Geneva, Switzerland.

And it is a difficult disease to treat because its symptoms are so late to appear. Mortality has hovered around 100%. The ray of hope was the knowledge, gained from accidental discoveries of early-stage liver cancer, that if it were found and treated early enough in its development, people could recover from it.

The problem then became one of finding a technique for early detection of liver cancer. This is where the monoclonal antibodies came in.

There is a blood substance called alpha-fetoprotein, or AFP, which normally is produced above a certain level only by the fetal liver—and by the liver of the majority of patients with liver or testicular cancer. Detection of blood AFP levels above a certain threshold value therefore becomes an indication that one of these two cancers may be present. Testicular cancer is easily diagnosed by other means, so it is easy to determine which of the two is the problem in any particular case. The monoclonal antibodies—two different ones are used in this technique—are specifically designed to attach to the AFP molecules, each at a different site. The resulting ability to detect abnormal AFP levels in the blood, and thus the presence of liver cancer, is four to ten times more sensitive than the best previous diagnostic test, which could not discriminate between several kinds of internal diseases.

Moreover, any competent medical laboratory should be able to carry out the new test in as little as an hour at nominal cost.

The transatlantic partnership that led to this new breakthrough was mobilized in September 1983 when Dr. Dominique H. Bellet of the Department of Biochemistry of L'Institut Gustave-Roussy of Paris arrived at the MGH to begin a collaboration with Dr. Kurt J. Isselbacher, Chief of the MGH GI Unit, and Dr. Jack R. Wands, MGH associate physician. The work was funded by the National Institutes of Health and a private French foundation, Fondation Pour La Recherche Medicale.

A test for hepatitis B: Hepatitis B, or serum hepatitis, is a usually nonfatal but often severe viral infection of the liver that affects a quarter of a billion people worldwide. Since blood products can transmit it, all transfused blood is routinely tested for the virus, but conventional screening methods may miss it.

Hence the importance of experimental results this year showing that a test developed by MGH researchers significantly improves our ability to detect hepatitis B virus contamination.

Dr. Jack R. Wands of the MGH GI Unit, under the direction of Dr. Kurt J. Isselbacher, describes the new test as an important new weapon in the fight against this disease. "We have improved not only the diagnosis of hepatitis B," says Dr. Wands, "but also our ability to manage it. This is a step toward ultimate prevention."

The new test, developed by Dr. Wands, Dr. Edna P. Ben-Porath, and Dr. Isselbacher, is an outgrowth of one of current medicine's most exciting breakthrough technologies, the bioengineering of monoclonal antibodies. Through techniques of genetic manipulation developed only in the past several years, it is now possible, quickly and cheaply, to create unlimited quantities of an antibody specifically (i.e., genetically) engineered for its exact medical assignment. The "monoclonal antibody" in the MGH test, for example, as compared to the body's natural polyclonal antibodies, is much more specific in binding to the hepatitis B virus and hence results in a more sensitive test. It appears to recognize all the known strains of the virus, even when the strain is present in very low levels or hidden within the "immune complexes" that form when natural antibodies surround a virus without destroying it.

Built on stilts over Venezuela's Lake Maracaibo, this village is the home of many descendants of an early sufferer of Huntington's disease.

On the walls of this large room are records of thousands whose families were afflicted with Huntington's disease.

A marker for Huntington's disease

Huntington's disease (HD) is a hereditary disorder causing involuntary movements, emotional disturbance, intellectual impairment and eventual death. It afflicts men and women of every race and country and today claims more than 20,000 victims in the United States. Another hundred thousand or so Americans—children and grandchildren of HD victims—live in fear that they will themselves prove to be carriers, and possibly passers-on, of the HD gene. Symptoms of the disease usually appear around midlife, but they can also show up in childhood or in old age. For those at risk and their families, the uncertainty and the resultant stress can last a lifetime.

Investigators in a small Venezuelan town examine a woman with advanced Huntington's disease.

But an MGH scientist, Dr. James F. Gusella of the Neurogenetics Laboratory in the Neurology Service and Children's Service, has now helped realize the first big step toward a test that will positively identify carriers of the HD gene. Such a test will free the minds of those who do not inherit it, focus the search for a medical treatment on those who do, and bring within reach the long awaited elucidation of the structure of this disease.

Using recombinant DNA technology, Dr. Gusella and colleagues discovered a "marker" signifying the nearby presence of the HD gene. The marker, a segment of DNA with distinctive patterns, turned up on one of the 46 chromosomes that comprise a human's genetic makeup.

DNA patterns pass from parent to child just like other inherited characteristics. The only way to test whether a marker was near the HD gene was to determine that these patterns travel together through large families known to have had HD involvement.

The trail for the all-important marker led to the study of a family in the United States and to a tiny village built on stilts over a Venezuelan lake where the residents included hundreds of descendants of a woman who died of HD more than a century ago.

The knowledge of HD gained by Dr. Gusella and fellow investigators applies also to other inherited diseases with similar symptoms, such as familial Alzheimer's disease and manic depression. "With these new techniques," said Dr. Gusella, "we can aim directly for the gene itself, the ultimate first cause, and try to correct the problem at its root."

With only a limited number of ICU beds available, firm guidelines must be established for allocating the special care.

Using intensive care

During the national nurse shortage of 1981, the MGH reduced its medical intensive care unit from 18 beds to an average of 11 in order to maintain the correct nurse-to-patient ratio.

The situation forced us to find better ways to determine which patients truly need intensive care. In July of 1981 we launched a research project to assess how much patient risk actually increases with less intensive care and to see if ICU resources could be allocated on a more equitable basis.

"It turns out," says principal investigator Dr. Daniel E. Singer, a member of the ground-breaking MGH Medical Practices Evaluation Unit, "that a lot of medical intensive care is primarily watching patients who are at 'high risk,' where 'high risk' is defined as a 5 to 10 percent chance of developing complications. The data show that physicians (in the study) continued to admit all patients who were very ill, but they cut down on the use of the intensive care unit for those thought to be only at some risk of becoming seriously ill."

Naturally there was concern among the staff that the bed shortage might compromise patient care. Researchers therefore studied the death rate of patients complaining of chest pains but not admitted to an ICU. The data showed little difference in mortality rates for 1980 (a period of full capacity) and 1981.

But Dr. Singer cautions against misinterpreting the study's results. "If a public planning authority were to look at these data and say they meant that the city's intensive care beds could be cut, for example, by 30 percent with no ill effects," he says, "it would be a tragically incorrect interpretation."

Rather, the study points up the need to establish sound guidelines for determining how to allocate scarce medical resources. The probability that an ICU bed would be available for a patient who needed it decreased from 95 to 55 percent after July 1981. This required our staff to be proportionally more able to predict which patients actually needed an ICU bed.

Locating deep-vein blood clots

This capability has so far been demonstrated only with laboratory animals, but if it holds up for humans, then we have found an important new medical tool in diagnosis of problems related to deep-vein blood clots. Such clots are a grave hazard. If they dislodge into the bloodstream and travel to the vital organs, they can cause death or severe permanent impairment.

Monoclonals have previously been used in searching out such clots through specificity to a protein called fibrin, found in blood clots. There was a problem, however, in that a material in the body plasma, fibrinogen, is sufficiently similar to fibrin to confuse the assay.

The new MGH study, funded by the National Institutes of Health, was carried out by Kwan Y. Hui, Ph.D., and Gary R. Matsueda, Ph.D., researchers of the Cellular

Molecular Research Laboratory, and Dr. Edgar Haber, Chief of the Cardiac Unit. The first steps in their technique involve exposing, by chemical slicing, a certain part of the fibrin molecule, then synthesizing a compound, called a peptide, that exactly resembles this part. Next, this synthetic peptide is injected into a mouse, whose immune system is thus stimulated to produce a natural antibody specific to the synthetic peptide duplicates. To reproduce this specialized antibody rapidly, it is removed from the mouse's spleen and fused to rapidly dividing cancer cells called myelomas. The resulting hybrid cells, hybridomas, are stable in culture and will continue to produce the desired fibrin-specific monoclonal antibody. Animal tests have demonstrated the ability of this M.A. to locate deep-vein clots. According to Dr. Matsueda, "The physician will have in hand an important new diagnostic tool. Knowing the presence of the clot at an early stage, the physician can take preventive measures."

Exercise—cooling down

We all learn to warm up properly before any serious physical exertion but may generally tend to be less careful about cooling down afterward. Yet an important MGH study reported this year that failure to cool down gradually may pose a threat to health and may indeed be responsible for some cases of sudden cardiac death.

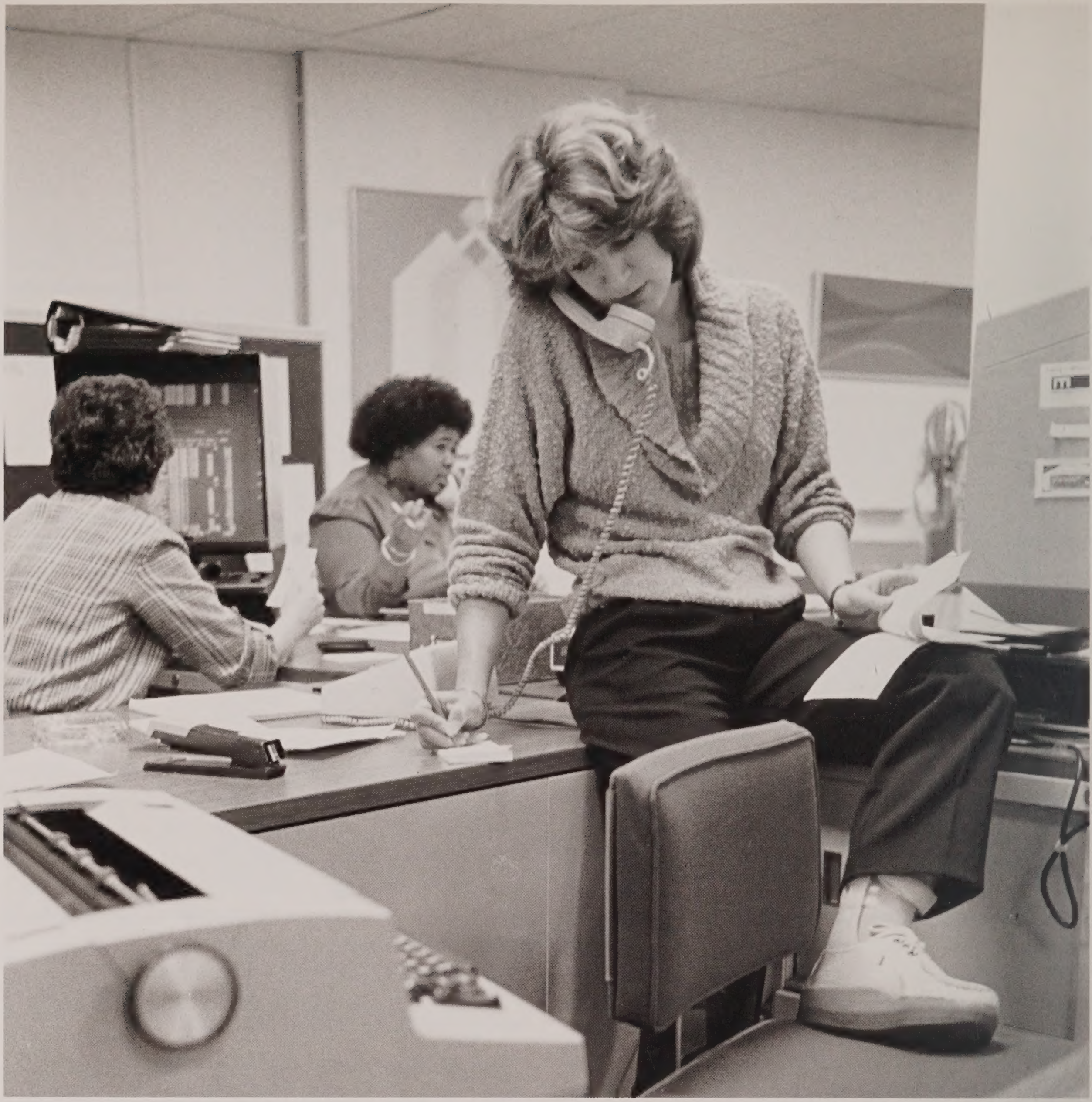
The research team, led by MGH psychiatrist Dr. Joel E. Dimsdale, has focused its studies on the physiology of emotional and physical stress, especially the chemical difference between them. In previous studies, Dr. Dimsdale and other MGH researchers found that the two hormones epinephrine and norepinephrine increase during both kinds of stress, but that epinephrine predominates with anxiety and norepinephrine with physical exertion.

What the new study found and reported this year is that, under physical stress, the body can increase its norepinephrine by 10 times the normal level. Norepinephrine is known to have a potent effect on the cardiovascular system. It increases blood pressure, and at a high level it can trigger arrhythmias or irregular beats of the heart. "It is these arrhythmias that are thought to cause sudden death," says Dr. Dimsdale. "They can occur when the athlete is working hardest or has just finished exercising. Enough norepinephrine will cause arrhythmias even in a healthy person."

The investigators found that, after exercise, norepinephrine levels are *higher* when the exerciser's blood pressure falls off more sharply, as it does with a sudden complete cessation of activity. The research group's theory is that this happens because the body's blood pressure sensors misread the sudden pressure drop as a sign of shock. To defend against this, they trigger an increased secretion of norepinephrine, one effect of which is to increase blood pressure. Fatal arrhythmias may thus result from the body's attempt to defend itself against a false alarm.

If this theory is correct, it means that proper cooling-down exercises are important not only to stretch out tight muscles but also to protect the heart.

On the other hand, as Dr. Dimsdale emphasizes, it does *not* mean that vigorous exercise is dangerous. Sudden death from exercise is rare. The benefits of exercise far outweigh the risks. "It is not the physical exercise itself that is dangerous," Dr. Dimsdale says. "It is stopping too abruptly and failing to cool down as gradually as one should, such as by walking for five minutes or so after vigorous exercise."



Free tissue transfer

Severe injuries to the lower third of the leg are difficult to treat. Blood supply to that part of the body is comparatively meager. The bone at the base of the wound, if it loses its blood supply, dies, and dead bone is an all-too-gracious host for bacteria. Chronic draining of pus from such wounds has plagued and threatened some victims for up to 20 years.

Since 1977 more than 60 MGH lower-leg patients—most of them survivors of auto accidents—have found relief through a microvascular procedure in which a portion of tissue, including artery and vein, is taken from the chest wall or inner thigh and used to fashion a flap with which to close the wound after removal of all unhealthy tissue.

The free-tissue transfer concept was shown to be possible in 1962, when Dr. Ronald A. Malt of the MGH performed the first successful replantation of a severed limb. This proved that tissues can be kept viable even after blood flow stops.

More time must elapse before any of the patients treated in this way can be pronounced cured, but Dr. James W. May, Jr., Chief of Plastic and Reconstructive Surgery in the MGH Department of General Surgery, sees grounds for optimism. "Since the series involving osteomyelitis (bone infection) began," says Dr. May, "we have yet to lose a free flap or see chronic drainage persist after a transfer."

Medical centers at Johns Hopkins University, The Mayo Clinic, and the University of California are also energetically studying free-tissue transfers, and the field is growing rapidly. "Transfer operations that were in their infancy only eight years ago," as Dr. May observes, "are now being performed by several of the hospital's surgical services. From one tissue transfer a year, the practice has grown to two or three each month."

Before undergoing a free tissue transfer which saved her left leg, Elaine Ruggera twice was advised elsewhere to consider an amputation.

Dr. Ayodeji Ogundiya examines a patient in the Oral and Maxillofacial Surgery Unit.

Facial pain

A distressing nerve disorder which can indefinitely affect sensation in the mouth and make it impossible to eat normally is finally yielding to new microsurgical techniques developed at the MGH.

The disorder involves components of the trigeminal nerve system that transmits sensation from both sides of the face, most often the mandibular nerve coursing through the lower jaw and the lingual nerve through the tongue. The difficulty is typically caused by the extraction of a tooth—most often a wisdom tooth—or a jaw fracture. It may manifest itself as a numbness, a shooting sensation, a sense of abnormality, or relentless pain. It frequently disappears after six months or so. But if it does not, and especially if its expression is pain, clearly the patient is in crying need of relief.

Dr. R. Bruce Donoff, Chief of Oral and Maxillofacial Surgery at the MGH, and his colleagues began laboratory development of microsurgical techniques promising to offer relief from the worst of these symptoms.

Microsurgery began to develop rapidly in the 1970s. It involves, as its name implies, the use of operating microscopes and specially designed instruments, and it makes possible the repair of the most minute blood vessels, nerves, and tendons.

The MGH team has applied the new techniques to 10 patients whose problem involved the lower jaw and 20 with a problem in the tongue. The former showed a 70 percent improvement; the latter, 80 percent. Most often, the problems were caused by scar or bone compression. When torn nerves were encountered, repairs were made with a half-inch segment of sensory nerve taken from the patient's heel.

"Recently we have been doing not only an external neurolysis," says Dr. Donoff, referring to removal of scar tissue compressing a nerve, "but also an internal one, opening up the sheath of the nerve and freeing the nerve itself of scarring. That would be impossible with just the naked eye."

Dr. R. Bruce Donoff points to a common area of pressure upon a facial nerve.

Growing skin

In early July 1983 in Casper, Wyoming, brothers Glen and Jamie Selby, 6 and 5 years old, having playfully covered themselves with some paint they had found, were trying to remove it with a solvent when they came into contact with a flame.

Each child was burned over 97 percent of his body, and 80 to 90 percent of the burns suffered by each child were third-degree burns, involving complete destruction of the skin.

Glen and Jamie were treated first at Children's Hospital in Denver, then a week later flown to Boston for treatment at the Shriners Burns Institute. "The boys had a few small areas of unburned skin, particularly under their arms and in their lower abdominal area," according to Dr. G. Gregory Gallico III, a plastic surgeon at MGH and the Burns Institute. Healthy skin from these areas was borrowed. In a process developed by the chairman of the Harvard Medical School Department of Physiology and Biophysics, Dr. Howard Green, this borrowed skin became the basis of new skin, cultivated in the laboratory, for the repair of the boys' traumas. Dr. Green supplied about a square yard of new skin for each boy. Dr. Gallico and a colleague, Dr. Nicholas O'Connor, now on the staff of Brigham and Women's Hospital, conducted a series of operations over the next five months in which this new skin was applied, covering more than half the body surface area of each child.

As of the close of our report period, the boys' new skin was still in place; being derived from the body's own cells, it is not rejected by the immune system. Also it is soft enough that the boys can walk about.

This process of skin generation is now sufficiently developed that Dr. Green's laboratory can start with a one-square-inch sample and within three or four weeks generate enough graftable epithelium to cover a patient's entire body.

Predicting the Nobel prize

In 1871, in memory of its cofounder Dr. John C. Warren, the MGH established the Warren Triennial Prize for outstanding scientific contributions in physiology, surgery, and pathological anatomy. Of 17 prize winners since lectures replaced dissertations in 1952, eight have become Nobel laureates.

There were two prizes awarded this year, both for pioneering studies in the cause of cancer.

Dr. J. Michael Bishop, Professor of Biology at the University of California, has focused on cancer genes which produce enzymes that phosphorylate (convert into an organic phosphate) proteins believed involved in making cells malignant. His lecture was entitled "Cancer Genes Unveiled."

Dr. Robert A. Weinberg, Professor of Biology at M.I.T., is one of the discoverers of oncogenes (cancer genes), the genetic components that are thought to direct the formation and development of cancers. His lecture was entitled "The Role of Oncogenes in Human Carcinogenesis."

Said Dr. Kurt J. Isselbacher, Chief of the MGH Gastrointestinal Unit and Chairman of the Warren Prize Committee, "These two scientists and their laboratories have made important, innovative contributions to our understanding of the causation of cancer."

A new treatment for precocious puberty

Premature sexual development, starting as early as at 10 months of age, is severe enough to require medical intervention in more than one child out of ten thousand and occurs six times more frequently in girls than boys. Precocious puberty is a distressing disease physically, resulting in abnormally short stature (half the afflicted girls grow to less than five feet) and occasionally leading to inappropriate social behavior. It can be crushing for the child's psychological growth. And there has been no way to treat it—until a recent MGH development.

The basis for the current dramatic change in the situation is the elucidation within the last 15 years of the brain chemistry which governs the sexual maturation process.

In 1971, it was shown by Salk Institute and Tulane University scientists, who would be honored for it six years later with the Nobel prize, that puberty is initiated when the hypothalamus, a part of the brain's limbic system, sends a messenger hormone—the gonadotropin releasing hormone (GnRH)—to the pituitary gland. In girls, the pituitary responds by producing hormones called gonadotropins. These hormones then stimulate the ovaries to produce estrogen. It is the estrogen that directly causes the rapid bone growth, the emotional volatility and the sexual maturation associated with normal adolescence.

In precocious puberty, the hypothalamic GnRH is released—for still mysterious reasons—prematurely. This occurrence then results in the premature production of estrogen, which in turn first makes bones grow too rapidly and then cuts off their growth too soon; a 5-year-old girl with a bone age of 11, for example, will only grow for about three more years. Her adult height will be severely stunted.

Along with other researchers, Dr. William F. Crowley, Jr., of the MGH Vincent Research Laboratories had learned that chemical rearrangement of the 10 amino acids of which the original releasing hormone was composed could result in analogues of much greater strength than the natural original peptide. One of these analogues, Dr. Crowley observed, at first stimulated the pituitary's reproductive function—its release of gonadotropins—but then paradoxically blocked it. Dr. Crow-

After 66 years of training practical nurses (at left, the class of 1922), the MGH Shepard-Gill School closed, bowing to a fast-paced technological progress that imposed more rigorous educational demands upon nurse candidates. Although modern-day graduates, such as Cheryl Alicea, LPN, provide excellent care, trainees must now also possess college degrees. The spirit of excellence instilled in its students will remain Shepard-Gill's enduring legacy to education and care at the MGH and elsewhere.

ley reasoned that this particular analogue, designated $LHRH_a$, might afford a means to halt through its paradoxical blocking effect the pituitary's production of gonadotropin and thus of the ovaries' production of estrogen. Lowering the body's estrogen level could then theoretically normalize the pattern of bone growth and sexual maturation.

In the study completed in FY1984, Dr. Crowley and his colleagues, Dr. John Crawford of the MGH, Dr. M. Joan Mansfield (then of MGH); and Dr. John Crigler of Boston's Children's Hospital, gave nine precociously mature girls daily injections of $LHRH_a$ for a year and a half. This resulted in a decisive lowering of the pituitary's gonadotropin and of the ovaries' estrogen, and thus of the rate of bone growth and of sexual maturation. The girls' secondary sexual characteristics receded, and menstruation ceased; age-appropriate behavior returned; and their chronological age began to catch up to their bone age.

"With this drug," said Dr. Crowley of $LHRH_a$, "we have fulfilled the four criteria we established. We have halted secondary sexual characteristics in these girls, reversed their adverse behavior, slowed their rapid growth, and retarded their precocious bone maturation. If our results stand up, as we expect they will, our treatment for control of precocious puberty will have widespread potential."

Dr. Crowley and his colleagues have now expanded this study with the aid of an N.I.H. grant to more than 70 children with this disorder who come to the MGH from all over the world. Results continue to be impressive. This form of treatment for precocious puberty, though still in its research infancy, appears to be well on its way to becoming the most effective treatment for this condition.

Treadwell Library — 125 years young

The MGH's Treadwell Library observed its 125th birthday this year with a reunion of more than 200 alumni of the MGH House Pupils' Association, returning from all over the country and the world for a day of seminars, lectures, and rounds in gynecology, pathology, neurology, radiation medicine, and surgery. Ceremonies included an Information Fair and the presentation of the Treadwell Award for most distinguished alumnus to Dr. James B. Wyngaarden, Director of the National Institutes of Health. Dr. Benjamin V. Treadwell of the Department of Orthopaedic Research made the presentation. He is a descendant of the original benefactor, Dr. John Treadwell, who left his extensive personal medical library and a $5,000 bequest to the MGH in 1858.

Montague Genetics Library

A victim of multiple congenital abnormalities, John Turner Montague was stillborn on January 26, 1983. His parents, Mr. and Mrs. Lynwood Montague of Newton, wanted to memorialize him in a special way, so they asked friends and family members, in lieu of flowers, to contribute to the establishment of a genetics library at the MGH in his name. Thus was the John Turner Montague Genetics Library at the MGH dedicated on the first anniversary of John's birth and death. Situated at the Genetics Clinic on the sixth floor of the Wang Ambulatory Care Center, this library continues to receive contributions and is a resource for all staff.

The Rev. Joseph Kelleher on one of his daily rounds to visit with patients

First Ruth Sleeper Scholarship

The Board of Directors of the MGH School of Nursing Alumnae Association this year awarded the first Ruth Sleeper Scholarship for academic performance, named for the director of the hospital's School of Nursing from 1946 until her retirement in 1966. The prize went to Marcia Gold, a second-year student in the Master of Science in Nursing program at the MGH Institute of Health Professions.

"Ruth Sleeper typifies the kind of nurse the MGH produces," said Linda Lass-Schuhmacher, RN, president of the Alumnae Association, "so we felt it very fitting to name this scholarship after her."

Miss Gold herself typifies the new breed of nursing student with a bachelor's degree from Simmons College, a master's from the University of Wisconsin, and eight years as administrative assistant to the Vice-President for Nursing at Beth Israel Hospital. Miss Gold is a member of the Institute's student government. She specializes in gerontologic nursing.

Scholarship prize winner Marcia Gold, center, accepts congratulations from Linda Lass-Schuhmacher, left, and Ruth Sleeper.

Fifty years of clinical pastoral education

Dr. Richard Cabot, internist and cofounder in 1905 of MGH's pioneering Department of Social Service, was also instrumental in 1934 in setting up the hospital's Clinical Pastoral Education Program, the first such general hospital program aimed at providing bedside instruction in pastoral care of the sick.

"The crux of the chaplaincy training program," explains its director and MGH chaplain, Phillip King, "is learning to listen for the feelings, religious resources, needs, and philosophies of people dealing with pain and illness. CPE students struggle with their own fears of sickness and death and learn to deal with the emotional highs and lows which accompany relationships with very sick people."

Since Dr. Cabot wrote his "Plea for a Clinical Year" to the seminaries fifty years ago, over one thousand seminarians, clergy, and selected lay people have participated in CPE at MGH.

2500 years old, and he never looked better

The 2500-year-old mummy of Padihershef, late of Thebes, arrived at the MGH 161 years ago, the gift of a benefactor, and was put on display in the MGH's Ether Dome where it stood silent witness to the making of much medical history, including the first public demonstration of anesthesia for which the teaching amphitheatre is named.

The mummy was fully identified only this last year as that of a stonecutter of Thebes. An unmarried artisan of about 40 when he died, his relatively modest status saved his tomb from robbers and left him remarkably intact.

Padihershef left the Ether Dome and the MGH this year —in a hearse, naturally—and was taken to George Walter Vincent Smith Art Museum in Springfield, Mass. There, in a painstaking process long overdue and offered by the Smith in exchange for display privileges, specialists restored wrappings that had loosened, restrung his burial beads, and cleaned his case in preparation for his leading role in the Smith's exhibition, "The Life and Times of Padihershef," a celebration of the common man of Egypt of the 600 B.C. period.

Padihershef is removed from his glass display case for a journey to Springfield.

Workers transport the mummy to a waiting hearse.

Coeditor David Crockett at a "coming out" reception for a book updating the history of the MGH

Twenty-five years at the MGH

The history of the MGH is to some degree the history of modern medicine. It is a history therefore well worth preserving. So every few decades we update our annals, and it was this year that we issued, *The Massachusetts General Hospital*, 1955–1980, edited by David C. Crockett, S. B. Sutton, and the late Dr. Benjamin Castleman, and published by Little, Brown and Company.

The quarter century covered here was a period of stunning progress in medical science and practice—the first open-heart surgery, the first replantation of severed limbs, the first transplantation of donated organs, the first grasp of the chemistry of genetics, the first appearance in medicine of a variety of space-age devices including the CT scanner, the laser, the cyclotron—which were all immediately adopted as basic weapons in the medical arsenal. There is no more exciting a period in the history of science, and the book would make a salient addition to any library of general ideas as well as to more specialized ones.

The series in which the current volume takes its place reaches back to the beginning, but the current volume differs from the others in that it is a compilation of separate papers by 60 individual authors—a departure which reflects the proliferating diversity of modern specialization. At the same time, however, this book confounds tradition by making people come alive instead of merely concentrating on facts.

First women associate general directors

For the first time in its 173-year history, the MGH appointed two women this year as Associate General Director.

The Board of Trustees honored Eleanor Clark, Director of Social Service, and Gellestrina T. DiMaggio, then Interim Director of Nursing. Only six months after her new appointment, Miss Clark died (see p. 25).

In announcing the dual honors last March, Dr. J. Robert Buchanan, MGH General Director, said:

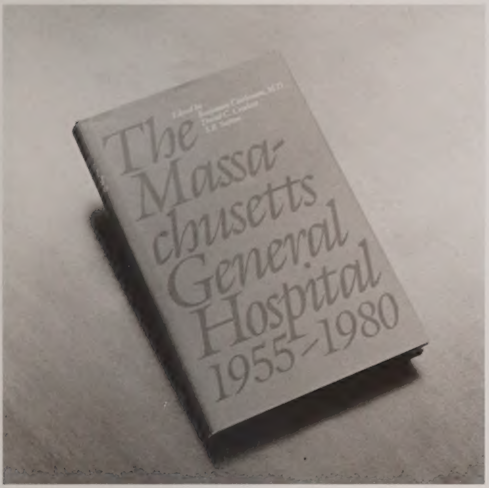
"These appointments recognize the high esteem in which Eleanor and Tina are held by all of us. Both women have made significant contributions to the MGH."

In her tragically brief tenure and while continuing to serve as Director of Social Service, Miss Clark helped to plan long-term care programs for the elderly and frail in neighborhoods surrounding the hospital.

"Our population is growing older," she said. "This 'graying of America' is changing radically the patient mix in acute care hospitals. By 1978 the elderly accounted for almost half of the patient care days in such hospitals."

Miss DiMaggio said that emphasis in the next few years

Associate General Director Gellestrina DiMaggio, who hopes to see the earlier release of many hospital patients with further care available in the home



must be placed on identifying nursing interventions that will enable patients to leave the hospital earlier and remain in a home setting. "Hopefully, the Nursing Department will be far more active in the area of research," she said.

With a bachelors's degree from Connecticut College for Women and masters' degrees from Yale and Columbia Universities, Miss DiMaggio came to the MGH in 1968 and served for many years as Associate Director of Nursing. In 1978, the American Nurses Association named her national Nurse of the Year.

Eleanor Clark

Eleanor Clark, Director of the Social Service Department and Associate General Director of the MGH, died on September 18 this year after an illness of several months.

Eleanor Clark, who tragically died just months after becoming Associate General Director

One of the first two women ever named to an associate general directorship at the MGH, Miss Clark was honored widely for her many contributions to the social service field, including programs in continuing care and adult foster care especially addressed to the needs of frail elders.

She became only the third Director of Social Service at the MGH when in December 1964 she took over the world's first hospital-based social service department founded in 1905 by Dr. Richard C. Cabot, an MGH physician.

"Our goals are exactly the same as those outlined by Dr. Cabot," she said later. "Our responsibility is to assist the patient in making the best use of medical care, whether it be preventive, curative, or rehabilitative."

Miss Clark directed a department which over a generation doubled in size to more than 114 people, including 55 social workers with master's degrees, 30 casework assistants, and seven registered nurses. The greatest proportion of that growth occurred during the sixties in response to the needs of patients covered by the Medicare and Medicaid programs, created in 1965, and the hospital's development of community-based health centers.

A native of Daytona Beach, Florida, Miss Clark was graduated from Lake Forest College in Illinois and the Smith College School for Social Work. In addition to receiving numerous national awards in her field, she authored several published works. She also served as a Professor at the MGH Institute of Health Professions and on the faculties of Smith and Simmons Colleges.

A memorial fund has been established in her honor in the MGH Social Service Department.

Ann Barnes

Dr. Ann Brace Barnes leaves behind her a real contribution to gynecological surgery at the MGH. She was the first woman to intern in the MGH Surgical Service (in 1962). She was a career-long advocate of ambulatory surgery. Last year a gynecological operating suite of the Surgical Day Care Unit was dedicated to her.

Her most important work was with DES, a drug that MGH gynecologists linked to a rare form of vaginal and cervical cancer in the offspring of women who took it during pregnancy. Dr. Barnes was 47 when she died this year after a long struggle with cancer. Says her colleague Dr. Janet McArthur, MGH senior gynecologist, "Dr. Barnes was an adventurous, courageous person in her profession, in her illness, in every aspect of her life. She dared to do what she believed in and had the stamina to carry through. We miss her."

Richard Talamo lectureship

MGH treasures the memory of pediatrician Dr. Richard Talamo, who interned with us in 1961 and 1962 and returned in 1965 as Chief Resident in Pediatrics. He moved to Johns Hopkins Hospital in 1974 and in 1979 became its acting Chairman of Pediatrics. In 1980 he was named Chairman of the Department of Pediatrics at the New England Medical Center. He was 46 when he died of cancer in 1981.

The lectureship established in Dr. Talamo's name came about through the combined efforts of staff members of the MGH, the New England Medical Center, and Johns Hopkins, and his colleagues in research around the world. It expresses the great esteem in which all of Dr. Talamo's colleagues hold him.

Presented this year at the Shriners Burns Institute, the first Talamo lecture was delivered by Dr. Pamela Davis of Cleveland Veterans Administration Hospital and Case Western Reserve University, speaking on the autonomic nervous system in cystic fibrosis.

Treating Olympic athletes

MGH orthopedic surgeon Dr. Bertram Zarins served as head physician to the United States Winter Olympic Team whose 126 athletes brought home eight medals from the XIV Games in Sarajevo in February 1984. Dr. Zarins headed a staff that included another orthopedic surgeon, two family practitioners, and four athletic trainers. Dr. Zarins' medical team treated 133 patients with conditions ranging from common colds to injuries from a frightening ski jump accident involving a competitor from Weston, Massachusetts, Matt Petri, who tore tendons and muscles and lost a large patch of skin from his left forearm. He had follow-up treatment at the MGH.

Before the Winter Olympics began, the American team organizers worried about the use of stimulating drugs by athletes from all over the world. The International

Olympic Committee enforced such rigid standards in Sarajevo that an athlete who took the wrong cold medicine or who drank too many cups of coffee on the morning of a test could find himself disqualified for drug abuse. The fact that no problem arose for the United States team in doping control or any other medical area is a tribute to the care and commitment of Dr. Zarins' medical group.

Standing at left behind members of our Olympic hockey team, Dr. Bertram Zarins, who supervised health care for all United States athletes at the Winter Games in Sarajevo

The General Hospital Corporation

Excerpts from audited financial statements (in thousands of dollars)

Income	1984*	1983**
From patient care	$299,967	$274,053
Less free care and contractual allowances	42,430	30,842
	257,537	243,211
Research and other specific purposes	78,101	93,369
Other	13,561	15,471
Total Operating Revenue	349,199	352,051

Expenditures		
For operating expenses: Salaries and related compensation	174,759	175,246
Supplies, expenses, depreciation	104,388	92,713
	279,147	267,959
Research and other specific expenses	68,161	82,742
	347,308	350,701
Surplus (Loss) from operations	1,891	1,350
Endowment and other income	926	688
Surplus (Loss)	2,817	2,038

*Year ending September 30, 1984

**Certain amounts in fiscal year ending 1983 have been reclassified to permit comparison.

The Hospital's Dollar

Diagnostic and Therapeutic Services: *Diagnostic services, therapeutic services, house staff and professional staff, drugs, supplies, etc.*	48.1%
Nursing Care	16.1%
Plant and Equipment: *Depreciation, interest, energy, telephone, maintenance*	13.0%
Room and Board Services; *Food, laundry, security, housekeeping*	8.4%
Administrative Services: *Computer, accounting, administrative salaries, etc.*	14.4%

Massachusetts General Hospital

Facts and Figures

	1983–84
Beds	1,082
Admissions	31,788
Ambulatory Care (Clinic) Visits	527,414
Inpatient Surgery	17,782
Emergency Ward Visits	70,236
Day (Outpatient) Surgery	7,900
Active Staff	1,445
Clinical Fellows	283

	1983–84
Residents	405
Research Fellows	220
RNs	1,020
LPNs	120
Nursing Assistants	75
Volunteers	906
Employees	8,413

HOSPITAL LAUND

In 1970, two years after coming to the United States from Portugal, Manny Costa went to work for the MGH Paint Shop and soon discovered that the hospital was treating a large number of Portuguese who spoke little or no English. Epitomizing the spirit of the volunteer, Mr. Costa quickly jumped into the breach, offering his services as an interpreter. Fluent in Portuguese, French, and English, he helps out at least 50 times a year. At Volunteer Recognition Day this year, he was honored with a special citation.

(founded in 1811 as the
original Harvard Medical
School teaching hospital)

The Massachusetts General Hospital
as of 12.31.84

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Ways of giving

From its founding in 1811 to the present, the Massachusetts General Hospital has been a monument to the generosity of private citizens. The simplest method of giving to the hospital is the gift of cash, but it is also possible to give securities, personal property, real estate, or life insurance. In addition, many companies have matching gift programs that double or even triple the value of a gift given to the MGH.

For an individual who has a greater annual income than is needed for current expenses, a *Charitable Lead Trust*, or the contribution of an "income" interest made by a transfer of property into a trust, may be appropriate.

It is also possible to take advantage of the various Life Income Plans offered by the hospital. The *Pooled Income Fund*, for instance, is a trust in which contributions of many donors who have retained life interests are pooled, operating in a fashion similar to a mutual fund. Other life income plans tailored to the specific needs of the donor are available.

Benefaction through bequests has played a vital part in the growth and development of the MGH. Funds may be left in the form of a *cash bequest; a bequest of all or a stated percentage of the residue of an estate, or a bequest of a remainder annuity trust or unitrust.*

Should you plan to include the hospital in your will, or should you be interested in one of the types of gifts described, the hospital could suggest to you or your lawyer specific wording for carrying out your wishes.

Please contact Herbert P. Dane, Director of Capital Campaign (telephone: [617] 726-2200), with any questions regarding your gift to the MGH.

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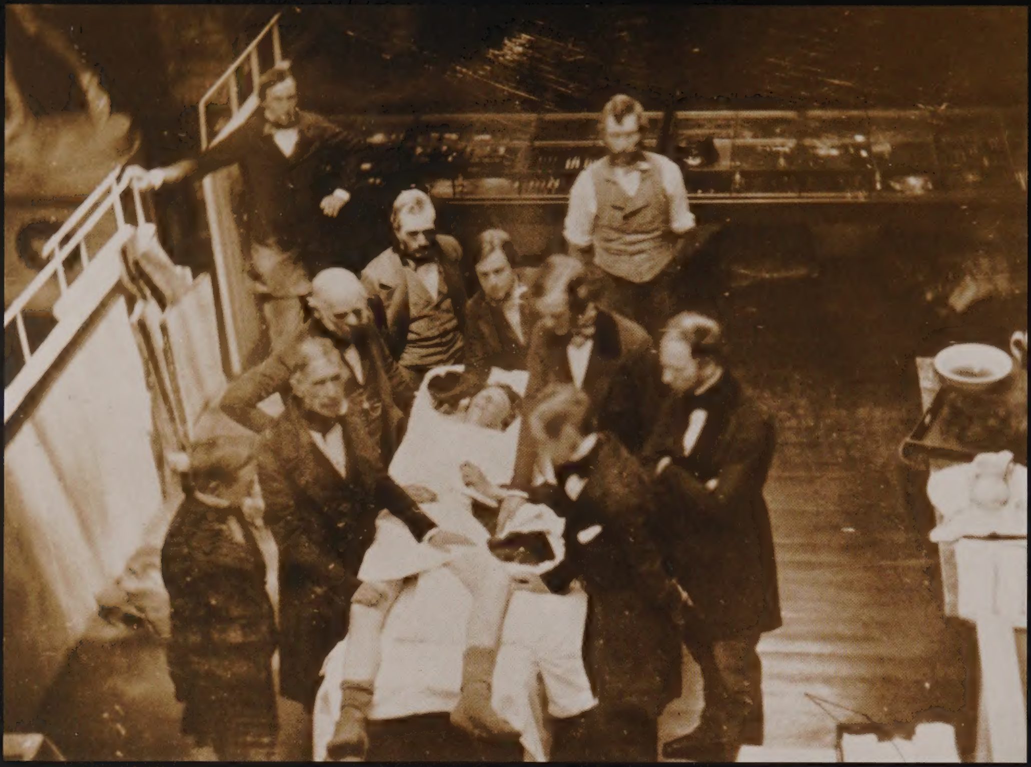
Massachusetts General Hospital 1985 Annual Report



As fiscal 1985 concluded, Massachusetts General Hospital looked to a beginning, not simply of another year but to its birth.

On February 25, 1811, the Great and General Court of the Commonwealth of Massachusetts granted the MGH its charter. In the 175 years that have elapsed, the hospital's advancement in medicine has been steady on several fronts: patient care, the training of physicians, and research to better the health of mankind.

The daguerreotype above depicts one of the earliest surgical operations employing anesthesia. Only a short time before, on October 16, 1846, the first demonstration ever by a hospital of painless surgery took place in the same room, now known as the Ether Dome of the Bulfinch Building.

The man with his hands on the patient's thighs, Dr. John Collins Warren, MGH Chief of Surgery, also conducted the original surgical anesthesia demonstration. To Dr. Warren's right is Dr. Oliver Wendell Holmes, who coined the term *anaesthesia*.

2 Chairman of the Board, Francis H. Burr, Esq.

3 General Director, J. Robert Buchanan, M.D.

4 Caring for the elderly

6 Alzheimer's Disease Research Center

7 Improving bone cement

8 Wang ACC dedicated

9 Malignant melanoma: the warnings

9 A special concert

9 Bruins star for MGH

10 The Icelandic connection

11 Biomotion lab

12 NICU bereavement group

12 Halcyon Place

12 Children's rheumatology outpatient service

13 Support group for adolescents

14 Jendi and her trip

15 Infant babbling

16 Ectopic pregnancy test

17 A foot replantation

18 War on AIDS

19 PET scanner installed

19 Shaun Harrington

20 Ward 4 moves to new quarters

21 First and latest ambulances

21 Sarah Doherty

22 Balloons to close weak vessels

22 A caffeine insecticide?

23 Free Electron Laser

25 YAG laser

25 IHP in gear

26 Yvonne Munn

26 Patricia Baldridge

27 Dr. Edward E. Heller

27 Evelyn Bonander

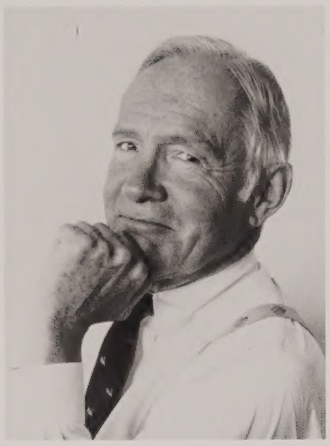
28 In memory

- **28** Dr. F. Dennette Adams
- **28** Dr. Stephen E. Hedberg
- **28** Dr. Jack R. Dreyfuss
- **28** Louise Hatch
- **29** Dr. Carl F. Cori
- **29** Edna S. Lepper

29 Our *Good Housekeeping* Award

Cover photo:
see story, page 7

Chairman of the Board



This has been a year of accomplishments for all divisions of the Massachusetts General Hospital Corporation: the MGH, McLean Hospital, Spaulding Rehabilitation Hospital, and the MGH Institute of Health Professions. For the MGH (the General Hospital), The Capital Campaign passed its halfway point and was by September 30 moving relentlessly toward $100 million, still a long way from the $169 million goal, but we are confidently optimistic that the many friends of the MGH will help us realize our objective.

Among the gifts making this possible was $6 million from James L. Knight, a patient of Dr. W. Gerald Austen, MGH Chief of General Surgical Services, for a new cardiac catheterization laboratory. This gift from the Chairman Emeritus of Knight-Ridder Newspapers, Miami, Florida, was announced at a reception hosted in Washington for The Capital Campaign by Vice-President and Mrs. Bush. Vincent Memorial Hospital gave $1 million for its planned new building, and Sumner M. Redstone also contributed $1 million during the year. Among the many corporate gifts was $250,000 by the Cabot Corporation Foundation, Inc., for the MGH Institute of Health Professions.

Throughout 1984–1985 we have thanked thousands of people who have helped us to date. There were so many gifts that for lack of space we'll mention only two others: the first installment on a one-quarter-million-dollar pledge made by MGH Ladies Visiting Committee and more than $25,000 netted by the International Fair imaginatively and successfully staged by the MGH Employees Capital Fund Drive.

As Dr. Buchanan points out in his report, we continued to struggle with cost constraints, but the combined effort of employees, volunteers, and friends has kept the institution's quality of care, research, and education unique.

Meanwhile McLean Hospital, operating under the regulations governing psychiatric institutions, has used its skillful management to forge a favorable fiscal year, maintain high occupancy, and enjoy high morale. At the same time McLean was moving closer to a joint-venture agreement with an outside organization which would provide an important source of future financial security.

As the newest member of the Massachusetts General Hospital Corporation, Spaulding Rehabilitation Hospital has made substantial progress toward becoming the best rehabilitation hospital in the country. Later in this report you'll read about little Jendi Hunt. Jendi underwent a series of life-saving operations at the MGH, and rehabilitation at Spaulding made it possible for her to at last go home. She symbolizes the kind of relationship that Spaulding enjoys with the MGH and many other hospitals.

Spaulding has continued to expand the number of patient-care projects it shares with the MGH. For example, during the year Spaulding obtained a certificate of need for home health care and began operation of a home health agency which will serve discharged patients from both the MGH and Spaulding.

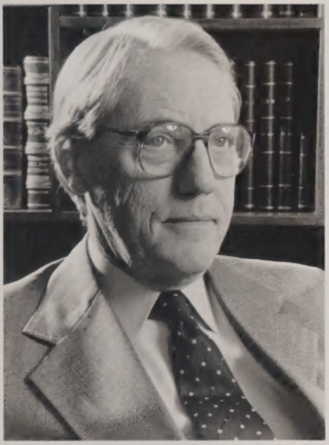
For the MGH Institute of Health Professions, this was a particularly auspicious year. The Institute acquired a new director of proven ability, Stephen N. Collier, Ph.D.; its own Board of Trustees headed by a dynamic chairman, E. Lorraine Baugh; and a new leader, Elizabeth M. Grady, Ph.D., RN, for its Graduate Program in Nursing.

Founded together in 1811, the Massachusetts General Hospital and McLean move toward their 175th anniversary year beginning in February of 1986. We all look forward to the celebration with a sense of excitement.

Francis H Burr

Francis H. Burr, Esq.

General Director



Every year the problem of dealing with external forces becomes more of a challenge. This fiscal year ending September 30, 1985, was especially trying. I am pleased to announce, though, that we have grappled successfully with the problem so far. We have managed to develop new patient care programs and capabilities in spite of governmental forces. But the institution is also feeling the pain which is always associated with the need to deal with the unknowns of change and to face the additional workloads which derive from reducing the nonpatient care work force. This added burden then has become the legacy to those who remain.

We have maintained our quality in the sense that fundamental excellence continues unchanged. But we place at risk the very special communion that this place has had with those who come here for help. What we have offered beyond good diagnosis and treatment are employees who have had the time and desire to be supportive and sympathetic to go that extra mile in ways that have left so many patients thinking that this is a unique institution.

As the governmental forces continue to pressure the health care system, we will have more and more difficulty preserving this special quality. I believe, however, the public will always quest for this kind of attention. To the extent it is diminished, there will ultimately be a reawakened demand on the part of citizens which, as is so often the case, percolates through the public opinion process to bring about an alteration in governmental policy. The question is not whether but when. That means the next few years will be extremely trying until people realize what they are losing and begin to reassert themselves at the grass roots level to governmental leaders.

During the period responsible institutions like the MGH will take every step they can to preserve the old value system. Some hospitals by virtue of age, tradition, and accomplishment have an implied social responsiblity to try to preserve these special qualities. I'm reasonably optimistic that in the main such institutions will succeed—provided that the public asserts itself before it is too late. But the ultimate outcome does rest with citizens responding before irreparable damage is done.

The preservation of this quintessential quality is as the seed crop is to the farmer. You just don't let that go to waste. Its significance to the past is a matter of record. But past performance is often a valid predictor for the future. What really counts is what you are doing right now and what you will be doing tomorrow. Sure it is grand to talk about the advances the MGH has made in the immediate and more distant past. They set an image of what lies ahead. If, though, we fail to live up to these great expectations, we will have diminished our value. The desire to excel, to be the best, to be number one—however that's measured—was never more important than now. It is critical to preserve that drive and that vision. Mediocrity is the natural enemy of greatness.

Robert Buchanan.

J. Robert Buchanan, M.D.

The American population is aging rapidly. The number of us who are over 75 will increase by 60 percent between today and the year 2000.

This is good news, of course. Longer life is a basic human aspiration and an intrinsic aim of medical practice. But the social aging process perfectly illustrates the way in which progress in one dimension of life can create problems in another. Because more of us are living longer, our society is experiencing an unprecedented, continuing increase in the numbers of elderly frail or ill who need health care but not hospitalization. This in turn imposes new requirements on the health-care system at the very time that economic forces restrict the system's growth and force an ever more rigorous reduction in costs.

The demand for more performance per dollar puts hospital administrations nationwide in a terrible squeeze. The new Medicare prospective payment system (DRGs) and tightening insurance payment practices, for example, are making it more difficult for hospitals to admit or to keep patients who do not require acute inpatient care, but who at the same time have serious medical problems. How do we care for these people properly without bankrupting the hospital system?

The MGH is currently involved in several programs designed to help deal with this problem, one of which has been in progress for more than 10 years; others were begun just this past year. The concept basic throughout is that the way to reduce the need for costly hospitalization is to improve the quality of care available outside the hospital.

The oldest of these programs was begun in 1975 at a 205-unit elderly housing project in Chelsea and repeated four years later at a 150-unit building in Chelsea. In 1979, Mary T. Ryan, RN, ANP, backed up by MGH internist Dr. Richard G. Pingree, began attending to health care needs at The Blackstone, an 11-story structure housing 175 residents, mostly elderly, near the MGH Wang Ambulatory Care Center. About 85 percent of The Blackstone's residents were without care when the MGH began this program. Such services may soon be brought to another nearby apartment complex for the elderly, the Amy Lowell House in Charles River Park.

One of the new efforts, the MGH Coordinated Care Program is now operating in Charlestown, Chelsea, and Revere and undertakes to insure the provision of whatever health services are necessary to enable elderly patients to remain able to live at home.

Under the program, teams have been established to manage high-risk, elderly patients' care needs from the moment of admission through discharge and beyond to care in the home, nursing home, or other facility. Alan Jette, Ph.D., Project Director, summarizes the program's aims thus: "Our goal is to see a reduction in the need for institutional care, a reduction in the rate of hospitalization, and fewer people going to long-term institutions." The Coordinated Care Program is supported by a grant from The Robert Wood Johnson Foundation.

Also new this year is the MGH Nursing Home Program which takes advantage of a new waiver of regulations by the U.S. Department of Health and Human Services that allows Medicaid to reimburse nurse practitioners for care provided to Medicaid patients in selected nursing homes. The MGH program is carried out by Alice Chaput, RN, ANP.

Its Director, Dr. Terrence O'Malley, says that "this program greatly improves the quality of care for Medicaid patients enrolled and expands the physician's ability to manage many more patients effectively with the nurse practitioner."

The net effect of these programs is to reduce the need for hospitalization by early and effective intervention and to shorten the length of stay by facilitating early discharge to a well-monitored home or nursing-home setting.

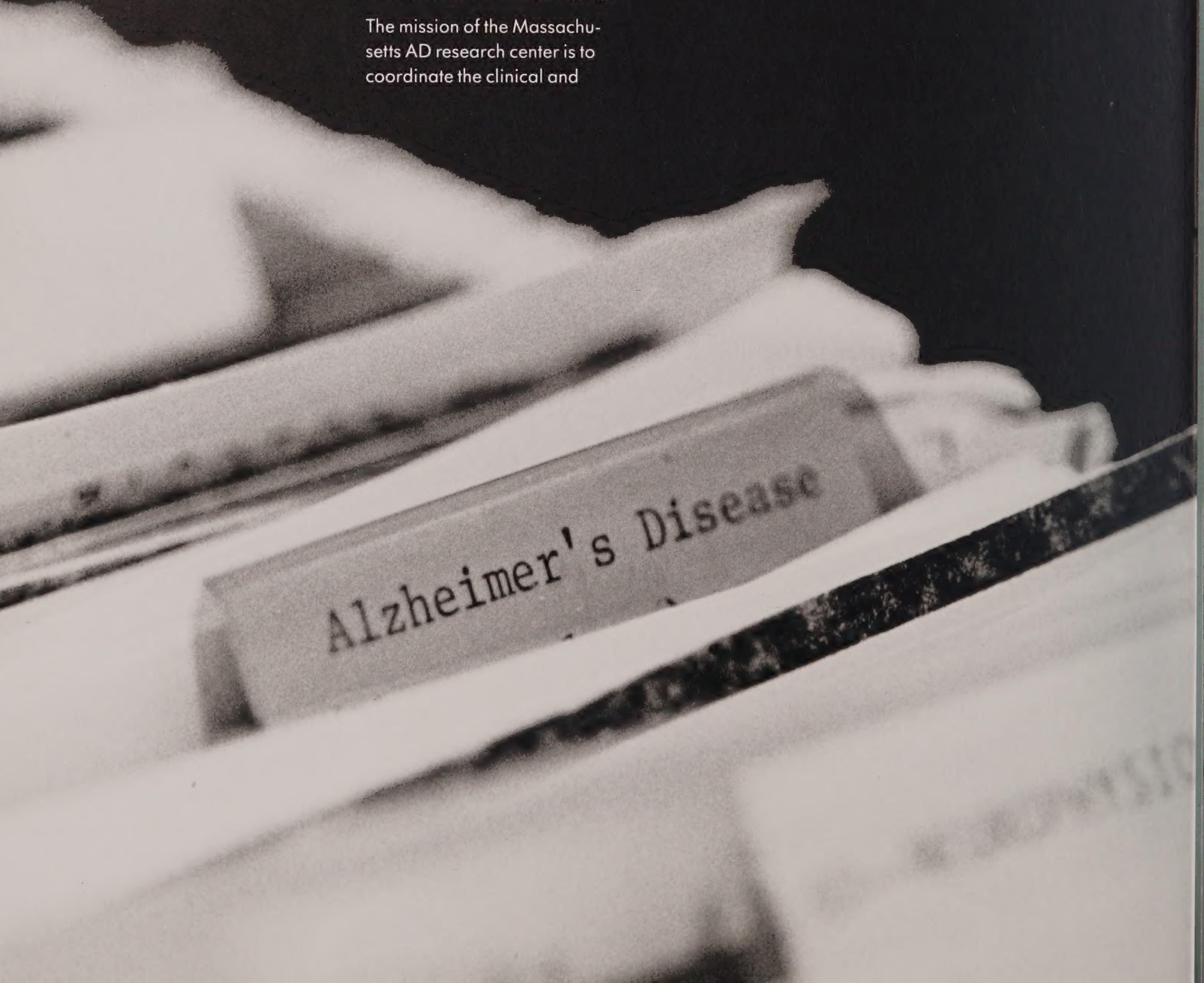
Alzheimer's Disease Research Center

As many as two million Americans are afflicted by Alzheimer's disease, or AD, sometimes called senile dementia, the most common cause of mental deterioration of adults in the United States. Half of all nursing home patients in this country may be suffering from it. Its cause is unknown, and there is no cure. Scientific study of AD is hampered by the lack of an animal model. Investigators must learn from the patients themselves, through observation during life and the analysis of brain tissue at death.

In an important new effort to break the grip of AD, Congress in 1984 funded the establishment of five national Alzheimer's research centers. One of them is a consortium of Boston-area institutions headed by Harvard Medical School and the MGH. Other participants in the local consortium are Harvard's Division on Aging and Harvard's affiliated Beth Israel, Brigham and Women's, and McLean Hospitals, the University of Massachusetts Medical Center, and the Massachusetts Institute of Technology. The center is funded for five years with a grant of nearly $4 million from the National Institute on Aging.

The mission of the Massachusetts AD research center is to coordinate the clinical and basic science research already being conducted by affiliated investigators and to stimulate new research into the problem of dementia. Clinical, statistical, and neuropathological core units will support research in four thematic areas: (a) biochemical study of the abnormal proteins that accumulate in the brains of AD patients; (b) possible genetic markers or familial traits; (c) anatomical and neurotransmitter abnormalities in AD patients' brains; and (d) clinical studies of behavior and neuropharmacology.

Other national AD centers were created in 1984 at the Johns Hopkins Medical School, the University of Southern California, the University of California at San Diego, and Mount Sinai Medical Center in New York City. Five additional centers were established in 1985. These are located at Duke University, Washington University in St. Louis, and the Universities of Kentucky, Pittsburgh, and Washington.



Of the 200,000 total hip procedures done each year worldwide, more than 10 percent are revisions of prior replacements that failed. A large portion of these failures occurred because the cement used to fasten the prosthesis to the patient's bone is porous and tends to break down within three or four years. This leads to a painful and recurring problem for thousands of sufferers.

But now a simple, cheap, and yet profound innovation introduced by Dr. Dennis W. Burke in the MGH Laboratory of Dr. William H. Harris appears to offer a major improvement in the bonding power of the cement.

Dr. Burke, Clinical Associate of the Orthopaedic Service, brought an engineering background and a knowledge of materials to the problem of the bonding power of the cement, a problem which had been under frustrated assault for many years. Dr. Harris's analysis of the failure of bone cement showed that the failure occurred where the cement was most porous. That is, the cement was failing because it contained bubbles, mainly bubbles of air. The way to get the bubbles out of it, reasoned Dr. Burke, was to centrifuge it.

MGH surgeons began centrifuging hip-replacement cement two years ago and have replaced several hundred hips without a failure to date.

Says Dr. Burke, "We must, of course, wait 10 years to prove the centrifuged cement holds up in real-life situations; but, based on the stress tests, we expect that it will."

Preparing a stronger, more durable cement for use in a hip replacement

Wang ACC dedicated

The entire MGH community shared a sense of accomplishment at the May dedication of the Wang Ambulatory Care Center, a building 32 years in the making and named in honor of one of Massachusetts' leading citizens, Dr. An Wang, founder and chairman of Wang Laboratories, and his wife, Mrs. Lorraine C. Wang.

The dedication honored the Wangs' pledge in September 1984 of $4 million toward the MGH's Capital Campaign, a revitalization program which seeks a total of $169 million to renew or replace many of the hospital's patient care and research facilities. Since the fund-raising effort began in 1981, donors have pledged nearly $84 million.

In designating their gift to ambulatory or outpatient care facilities at the MGH, the Wangs have supported the hospital's most active service to the Greater Boston community. The nine-story Wang ACC, opened in 1982, houses nearly 100 specialized outpatient units. Each year patients make about half a million visits for a range of services that includes special exercise, psychiatric counseling, sports medicine, radiation therapy, chemotherapy, and day surgery. One third of all surgical procedures performed at the MGH take place in the day surgery unit of the Wang ACC.

"In keeping with our efforts to hold down hospital costs," said MGH General Director J. Robert Buchanan in announcing the Wangs' gift, "the Wang Ambulatory Care Center provides our patients with a less expensive alternative to many inpatient treatments. The centralized services are not only more efficent and cost effective for the hospital and its staff but have also made high quality health care more accessible to our patients."

To the Wangs, the MGH contribution is a continuation of philanthropic endeavors aimed at benefiting the people of Massachusetts. "I have always believed that each of us has a responsibility to return to our community a portion of what our community has given us," said Dr. Wang. "I obtained my education in Massachusetts, raised a family here, and was offered the opportunity to build Wang Laboratories. It is only appropriate, therefore, that I share my success with the community and the people who made it possible."

Concluded Dr. Wang, "If our gift helps to save life, we will feel grateful that we had the opportunity and the resources to make it possible."

The Wang Ambulatory Care Center

Malignant melanoma: the warnings

Malignant melanoma is the most serious form of skin cancer, and it is increasing in the United States at an alarming rate. Since 1960, mortality from cutaneous melanoma in this country has risen more than mortality from any other cancer except lung cancer. About 18,000 cases of skin cancer were diagnosed last year, and about 5,500 patients died of the disease. It is expected that 22,000 new patients will be seen this year.

This rise underscores the need to learn five warning signs:

- A history of melanoma among blood relatives
- Poor or no tanning ability, often with a history of blistering sunburn during adolescence
- Unusual moles with very dark or irregular pigment patterns and borders
- A mole larger than a dime
- A mole present at birth

The silver lining here, reports MGH Chief of Dermatology, Dr. Thomas B. Fitzpatrick, is that there has also been "a gratifying increase in the proportion of tumors that are thinner, less invasive and more curable." Patients with early melanoma have a 95 to 100 percent survival rate.

A special concert

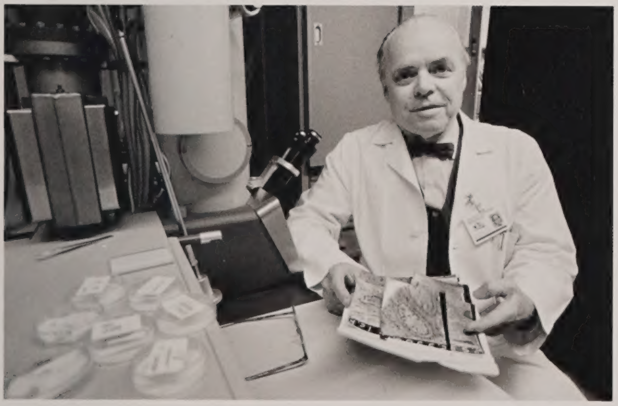
Jim McCabe had recently been a patient at the MGH when he won a competition at the Bank of New England, where he works, for which the prize was a personal concert by the Honors String Quartet of the New England Conservatory of Music. In appreciation of the care he had received at the MGH, Mr. McCabe donated his prize to the hospital's Chapel Concert series.

"Not only did I receive extraordinary medical attention at the MGH," said Mr. McCabe, "but all the doctors, nurses, and staff went out of their way to make my stay pleasant. This prize gave me the opportunity to share my good fortune—and to say a public thank-you to Mass. General."

Bruins star for MGH

Boston Bruins hockey center Barry Pederson underwent a three-hour operation at the MGH this year for the removal of a 2-by-3-inch fibrous tumor from his upper right arm. The procedure was carried out by Dr. Henry J. Mankin, Chief of MGH Orthopaedic Surgery, who said that with normal progress in physical therapy the star athlete would be back on the ice for the coming season.

A few months after Mr. Pederson's operation, the Bruins organization celebrated an MGH Night at Boston Garden, and the Bruins wives presented the MGH Children's Service with a check for $17,000—proceeds from the sale of the Bruins' team calendar. The Bruins themselves also gave $5,000 to the Children's Service and $5,000 to the Sports Medicine Clinic.



Dr. Thomas Fitzpatrick stresses the importance of recognizing the warning signs of skin cancer.

Boston Bruins hockey star Barry Pederson in action

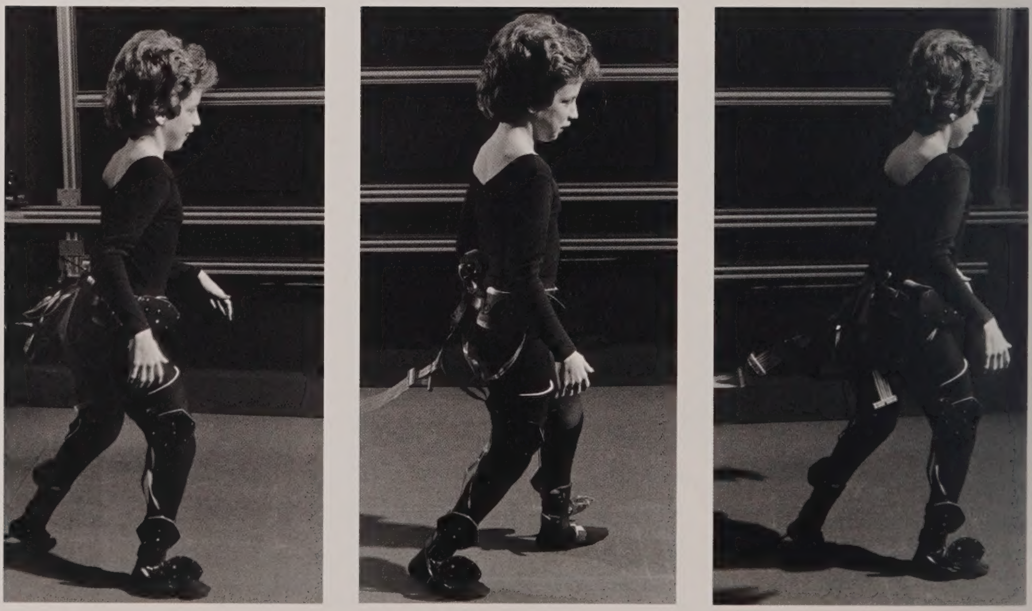
Healthier with a new kidney in place, Asta Hjaltason looks forward to going home.

Asta Hjaltason, two and a half years old and so weak that she could not stand, arrived at the MGH from Iceland in November 1984 for an emergency kidney transplant. Four months later her father called her "a brand new child" as she returned to Iceland with her new kidney and a bright new future.

Asta was the third child in two years to profit from the lifeline which Dr. John T. Herrin, Chief of Pediatric Nephrology, and the MGH have informally extended to the tiny republic in the North Atlantic. All three children suffered from congenital abnormalities that resulted in kidney transplants.

The need for this lies in the fact that Iceland's medical system—which is excellent, with more doctors per capita than any other nation in the world—is too small in absolute terms to support facilities for pediatric kidney dialysis or organ transplantation. The Icelandic connection to the MGH covers an important medical need in an efficient way and helps us deliver our services to a larger base.

Eleven-year-old Julie Kates has a gait analysis test in the MGH Biomotion Laboratory.

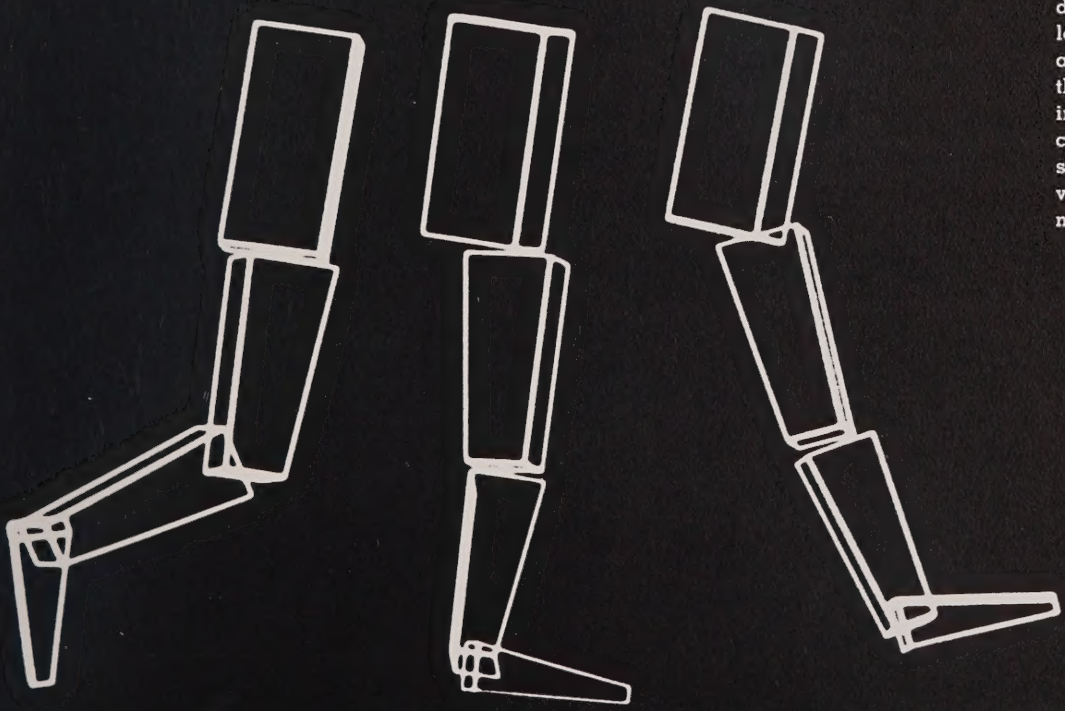


Scientists at the MGH and M.I.T. have collaborated in the design of a new computerized system to help surgeons analyze abnormal walking, devise corrective treatment, and study its effects. The system combines infrared cameras and lights and force plates under foot to create a computer-screen three-dimensional display of the patient's gait. Through this analysis specialists can identify the walking abnormality, determine an appropriate medical response, and quantify its efficacy.

"The system can analyze a child's walking pattern quickly and within minutes can demonstrate the dynamics of the child's gait," says Dr. W. Andrew Hodge, an MGH orthopaedic surgeon and Clinical Director of the MGH Biomotion Laboratory, supported by a grant from the Edwin Phillips Trust.

The first group of patients to be analyzed with this system were children with cerebral palsy. Says Dr. Hodge, "The gait of the cerebral palsy child is so abnormal and asymmetrical that it is hard for the physician's eye to assess what is happening. With this new diagnostic capability, many of these youngsters stand to benefit considerably."

The unique visual image produced by the special computer graphics developed for this method can be rotated with just the turn of a knob to be viewed from any side (front, back, right, or left). A new format of representation of the limbs as geometrical solids allows for precise depiction of three-dimensionality. The technique makes possible a scientific, quantifiable assessment of the progress of those undergoing treatment for gait abnormalities which can be readily understood and visualized by the primary treating physician.



A computergraphics display of a patient's leg and pelvis during a step. From the three-dimensional images, a specialist can detect even the slightest rotational variations from normal walking patterns.

NICU Bereavement Group

Our Neonatal Intensive Care Unit (or NICU) sees babies whose lives are extremely at risk. All who come to us were born at other hospitals, and most were brought to us by ambulance within 24 hours of birth, barely clinging to life. It is a tribute to the quality of care offered by the NICU staff that in 1983 the unit's survival rate was 87 percent.

Yet the NICU staff inevitably sees much loss and grief. And this grief can be quite severe. The death of a newborn infant can be one of life's most wrenching experiences. As Rosalie Tyrrell, an MGH psychiatric clinical nurse specialist, explains, "Each child evokes a special memory for the parent, even if that child lived for only one day."

In order to provide continuing care to parents whose infant has died, two MGH-NICU nurses, Anne Armstrong and Bernadette Reilly-Smorawski, in 1983 organized the NICU Bereavement Group.

The group offers a series of 12 weekly meetings at which parents are able to share with other parents who are experiencing similar grief. The nurses see their role as cofacilitators who provide support and feedback.

The group begins by conducting a "life review" of the infant from gestation through delivery and the struggle for life in the NICU. Parents usually go on to discuss family reactions to the death of the baby. They find such items as the baby's hospital bracelet, a photograph, and a lock of hair very comforting as mementos of the infant's short life.

Parents work from the beginning on "the task of letting go." Says Miss Tyrrell, "A big part of this process involves talking about how they feel. Very often a husband and wife will say things to a group that they are afraid to say to each other. So for them this is the one place to talk about their baby and their feelings of loss."

Halcyon Place

Parents from outside the Boston area who must be near the bedside of a critically ill child have often had difficulty finding temporary lodgings near the hospital.

Sheila Brown and Barbara Dillon were two such parents. Both had kept vigil with dying children in MGH pediatric wards. Both had experienced first hand the need for a supportive and calm respite away from the hospital. With the support of Dr. John T. Truman and Dr. Allan Goldblatt of MGH Children's Service, the two mothers began an organizing and fund-raising effort that spanned five years and culminated this year in the opening of Halcyon Place.

Halcyon Place is a 27-bed facility in Boston's Back Bay within walking distance of the MGH. The home is supervised by a full-time manager, and it offers kitchen and laundry facilities. It is available at a nominal fee to patients' family members referred by MGH admissions.

Children's rheumatology outpatient service

As part of an areawide program for the diagnosis and treatment of connective tissue disease in children, the MGH Children's Service and Arthritis Unit this year opened a children's rheumatology outpatient service that sees referred patients on the first and third Mondays of each month. The program is under the direction of Dr. John A. Mills, Dr. Donald N. Medearis, Jr., and Leslie Fourt, RN.

Families of MGH patients find inexpensive accommodations in a warm and caring atmosphere at Halcyon Place.

Support group for adolescents

Dr. Susan Kroop, top right, prepares to examine 3-year-old Julie Dietrich in the children's rheumatology outpatient service.

Being a teen-ager can be tough, as most of humankind can attest, and it is all the tougher to be a teen-ager in the hospital. Fears of the loss of good health, confusion about care and about what the future holds, interruption of routines and plans, the loss of privacy that budding adults especially need—these pose recurrent challenges to the care-givers.

Teen-agers' emotional requirements are especially complex because it is in these years, as former children begin to acquire their adult characteristics, that their need for support begins to shift from their parents to their generational peers. Parents who would give their all for their children sometimes find it hard to understand their teen-ager's strong and sometimes exclusive need for other teen-agers.

Recognition of this requirement is the premise of an MGH program instituted three years ago by Children's Service nurses Ann Gerberg, RN, BSN, and Kathryn Pazola, RN, MSN, called the Adolescent Support Group. In this group's once-a-week, hour-long, nurse-supervised meeting, our teen-age inpatients are encouraged to articulate their feelings freely and taught to deal with their problems by sharing them with one another.

This regular rap-session format provides our teen-agers with a structured, yet open-ended, opportunity to air their thoughts and fears within a group of peers who are bound to share them. We believe this is helpful in setting the right psychological attitude for coping with illness; certainly it makes hospitalization itself a less intimidating ordeal.

Michele Piwowarski found that meeting other teen-aged patients at support group sessions avoided loneliness.

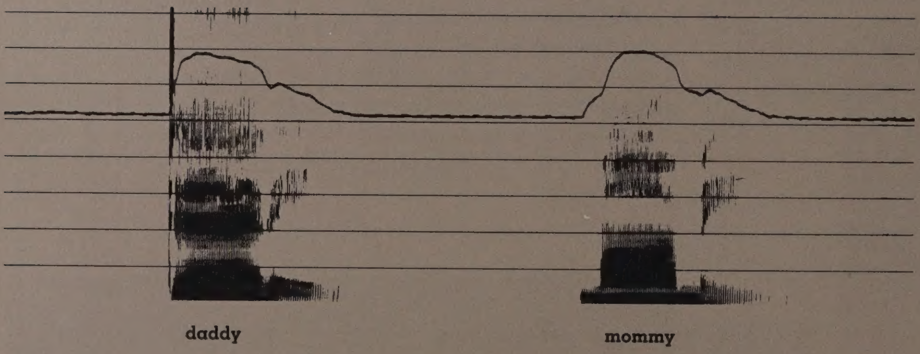
Jendi and her trip

Jendi Hunt was born with her intestines outside her body, a condition known as gastroschisis. "It was one of the most severe cases I had ever seen," said Dr. Samuel Kim, the MGH pediatric surgeon who performed over a dozen operations on Jendi within less than a month to get her problem under control.

As a patient of the MGH Children's Service with her condition adequately stabilized, Jendi was able to receive physical therapy and was also seen by the Burnham Child Development Team and the Speech-Language Pathology Department. She was then transferred to the Child & Adolescent Unit at Spaulding Rehabilitation Hospital, a major affiliate of MGH. During her treatment at Spaulding, Jendi was ultimately weaned from a ventilator which had helped her with her breathing. Under the direction of Dr. Joseph Hallett, an intensive developmental therapy was implemented involving occupational and physical therapists, speech-language pathologists as well as psychological and social developmental specialists.

Five months later, with eight other youngsters from both MGH and Spaulding, Jendi had improved enough to be the guest of Western Airlines for a vacation trip to Salt Lake City.

Her remarkable progress to date is a testament to the good effects of combining medical and rehabilitative techniques in the care of the acutely ill. Or as Jendi's father summarized it when he took her home—"a miracle."



The bars in each vertical spectrographic display represent the sounds in "daddy" (left) and "mommy" (right). The wavy horizontal line at the top indicates the intensity of the sound patterns.

Can a baby's recorded babbling offer clues to later qualities of speech? The MGH's Neurolinguistics Laboratory is studying the question.

Our Neurolinguistics Laboratory opened in 1984, devoted to the study of the brain's performance of the functions needed in speech and the use of language—functions that include the perception and uttering of speech sounds, the storage and retrieval of words, the production and recognition of sentences, and so on.

Certain of the laboratory's work focuses on disorders of early speech and seeks to trace their origins to still earlier vocalizing. Lab director John L. Locke, Ph.D., points out that a baby is aware of the sound of its own voice within 18 hours of birth and from that moment on may be engaged in the learning of speech and language skills that will not appear until 10 to 18 months later. Or the other way around, there is a theoretical possibility that speech deficits that only become apparent at the age of a year or so are covertly present in the prespeech babblings of infancy. If these deficits could be detected there—in the babbling stage—perhaps steps could be taken to prevent them or to reduce their later severity.

Dr. Locke believes that babbling is biologically rooted and little influenced by the baby's culture. He points out that all babies cry, laugh, shriek, and coo to express emotion during the first few months of life, and that at about 6 to 10 months we all become babblers, irrespective of race, nation, class or language group. We all even tend to babble in much the same way the world over. Our first sounds tend to be the open *ah* sound begun with a dental consonant ("da-da") or with the nasal consonant ("ma-ma") produced while breastfeeding. The baby words for father and mother in virtually all languages, interestingly, adopt these sounds.

Thus, the study of babble—and the transition from babble to speech—commands a broad fascination. It is of great concern to the linguist because it situates us in effect at the dawn of language and allows us to behold its reinvention. It is of equal concern to the speech pathologist because it can show us in detail how certain speech disorders arise and make it possible to detect them earlier and treat them more effectively.

Ectopic or "out-of-place" pregnancy occurs when a fertilized egg fails to reach the womb and yet continues to grow, generally in a fallopian tube but sometimes in the abdominal cavity or in an ovary. It is always a dangerous condition. Without surgical intervention, the tube ruptures, the fetus dies, and the mother's life is put at great risk.

And the incidence of ectopic pregnancy is growing alarmingly. For reasons that are still somewhat obscure—perhaps related to increased use of intrauterine devices—recent years have seen nearly a threefold increase in the incidence of these problems, rising as high as one for every 32 live births. Maternal deaths from these abnormal pregnancies, thankfully, have declined nevertheless because of our growing ability to diagnose and treat this condition at an earlier stage. But the strange surge in incidence makes it all the more welcome to report the development of a new test that can diagnose ectopic pregnancy within six days of conception.

The test is based on the fact that a hormone produced by the developing fetus appears twice as rapidly in a healthy pregnancy as in an ectopic one. The test is indicated for women most at risk of producing an ectopic pregnancy. This group includes those with a history of pelvic inflammation, a congenital abnormality or a constriction in the area, a previous tubal operation, or who have used an intrauterine device.

The clinical application of this difference between the hormone rise in an ectopic and a normal pregnancy was developed by Dr. Nicholas Kadar, a young English gynecologist who studied at Yale University Medical School and trained at the MGH. His work was supported by the Vincent Memorial Hospital, the MGH gynecology unit.

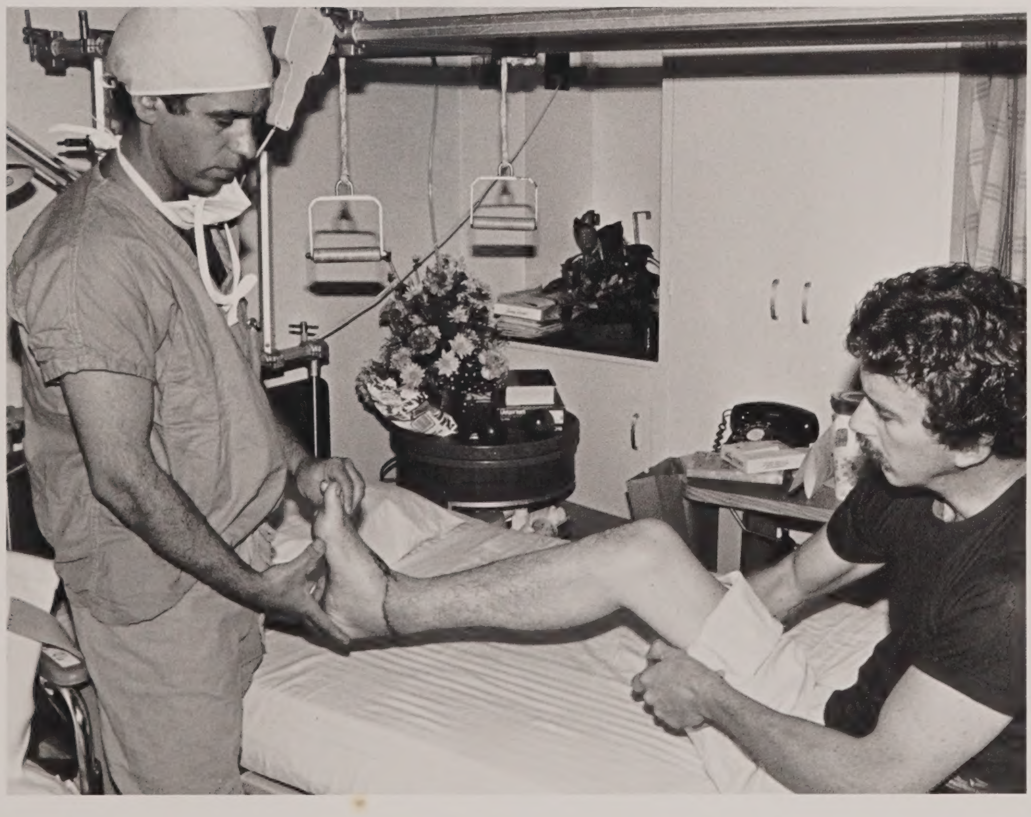
Bruce Ristow of Columbia, Maine, a 33-year-old industrial art teacher, was mowing his lawn last spring when a rotor blade broke off and severed his right leg at the ankle. He was given initial treatment at the Maine Coastal Memorial Hospital in Ellsworth, then flown to Boston by Bar Harbor Airlines. He arrived at the MGH on the day of the accident, May 31.

The MGH made medical history in 1962 with the world's first successful replantation—the arm of a 12-year-old-boy. But successful lower-extremity replantations are rare, and none had as yet been attempted at the MGH when patient Ristow arrived. Since considerable tissue loss often accompanies leg amputations, it is generally easier to restore a proper gait through use of a prosthesis. When the injury involves crushed nerves as well, restoration of feeling to the foot is problematic.

But as Dr. Jesse B. Jupiter, the MGH orthopaedic surgeon who headed the team caring for Mr. Ristow, explained, "Very rarely have we seen an injury that was so amenable to a successful replant or a lower-extremity replantation candidate for whom the considerations for a replant were so clear."

What made this so was the fact that the lawnmower blade had cut sharply straight through the bone, so that less than an inch of tissue had to be sacrificed, a loss that could easily be compensated for by a built-up shoe.

The surgery required 14 continuous hours and was carried out by two teams under Dr. Jupiter, including Drs. Thomas E. Trumble, Christian J. Bour, and Margaret M. Landy. As of our report period, their patient is ambulating on his foot without support.



Dr. Jesse Jupiter assesses the progress of Bruce Ristow after replantation of the Maine teacher's severed right foot.

Acquired immune deficiency syndrome, AIDS, was first diagnosed in 1981, and everything we have learned about it since has deepened our sense of the threat and the problem which it poses.

The creature which we call the human T-lymphotropic virus-III, the cause of AIDS, is one of the most formidable viral foes humanity has ever faced. HTLV-III attacks specifically the body's T-lymphocytes, cells that play a critical role in the operation of the immune system. With the T-lymphocytes knocked out, the body is exposed to a stream of unanswerable infections. The disease is thought to incubate for a period of one or two years or more. The mortality rate is 50 percent at one year; it approaches 100 percent at three. Of the more than 15,000 patients diagnosed since the first appearance of the disease in 1981, about one-half have died. There has not been a single recorded cure.

Viruses are hard to fight, and the HTLV-III is especially hard. It lives within the cell which it attacks rather than in the plasma surrounding the cells. This makes it more difficult for antibodies to find it and counterattack. It evolves rapidly, moreover, often partially changing its outer coat to avoid attack.

Further, the virus can be carried by people who remain apparently healthy as they unknowingly transmit it to others. The high-risk populations are still, as earlier, homosexual males, intravenous drug abusers, and people exposed to infected blood by whatever means. However, the numbers of cases in the heterosexual population without known risks continue to rise as well.

It is for such reasons that the AIDS epidemic is now considered one of the gravest health threats of the century. The MGH has been active in the research war against AIDS since an MGH project in 1984 isolated the AIDS virus in the semen of a healthy male homosexual. That same year, another MGH study showed that hospital workers who treat AIDS patients are at low risk provided they follow precautions recommended for those working with any virus.

Continuing MGH research projects this year have shown that both interferon and phosphonoformate are potentially effective in arresting the devastation caused by this virus.

Interferons are a family of proteins produced by the body to fight viral infections. The conclusions of a study which were presented this year by Dr. David Ho and Dr. Martin S. Hirsch of the MGH Infectious Disease Unit showed that interferon inhibited the spread of the AIDS virus in a test tube. A few months later Dr. Eric Sandstrom and Dr. Hirsch announced another, similar determination, that the antiviral drug phosphonoformate, or PFA, achieves the same kind of result as well. Researchers stress that these findings have yet to be demonstrated in patients, although patient trials have now begun. But these are at the same time vital first steps without which nothing larger can be achieved. Interferon and PFA are now added to the growing list of antiviral agents that have inhibited the growth of the AIDS virus in tissue culture.

Dr. Martin S. Hirsch

PET scanner installed

Valuable new information about stroke, brain tumor, and other neurological disorders is expected to result from research using the brain PET scanner, the first of its kind in New England, installed this year at the MGH.

PET stands for positron emission tomography. The scanner works by tracking radioactive particles and forming three-dimensional, computer-screen images of the particles' distribution through the brain (or other organ). It is the latest of several nontraumatic imaging devices to appear in recent years that make possible the direct visualization of the internal structure or function of the living body's organs. The CT (computed tomography) and MRI (magnetic resonance imaging) scanners provide exquisite spatial resolution of structures, whereas PET is the only technique that can show both blood flow and metabolic processes (such as oxygen use) in the tissues themselves.

Dr. Robert H. Ackerman is Director of the Cerebral Blood Flow and Metabolism Laboratory. He has been active in the field of brain PET scanning for the past 10 years. Of the potential contribution of this technique, Dr. Ackerman says, "Our increased understanding may allow us to identify more effective treatment for stroke disease and for many less acute neurological illnesses, including epilepsy and Huntington's, Alzheimer's, and Parkinson's diseases."

In stroke disease, for example, PET can provide data available by no other means. "Until now," says Dr. Ackerman, "people have had a negative attitude toward the treatment of stroke disease. This is because when a stroke occurs the physiology of the brain changes very rapidly, so that a treatment appropriate at one point might be inappropriate or even harmful just a few hours later. Only PET can show us the rapid changes in metabolism we must see in order to develop a meaningful course of therapy."

The MGH has been a leader in positron emission research since 1952 when Gordon Brownell, Ph.D., Director of MGH Physics Research, designed a two-dimensional positron imaging device to help localize brain tumors.

Shaun Harrington

We lost a patient this year named Shaun Harrington, a 6-year-old boy who was with us for a liver transplant. Shaun had to wait almost three months before a suitable donor organ became available. During that time, the child's condition had significantly deteriorated. The transplanted liver was functioning, but he had lost too much time.

But other young patients who have undergone liver transplants at the MGH when donor organs were readily available have done extremely well.

This sad contrast once again underscores the need for an effective organ-donor program. A great many lives that are now being lost could be saved, but it appears that a profound change in public attitude will first have to take place.

Shaun Harrington

Ward 4 moves to new quarters

Sixty years ago the MGH set up a special ward for clinical research in metabolic diseases, dedicated to the proposition that today's research is tomorrow's treatment. Winning renown as "Ward 4," this 10-bed unit boasts a roster like a medical who's-who with such names as Howard Means, Walter Bauer, Joseph Aub, Fuller Albright, and Oliver Cope. Despite its widening fame, Ward 4 remained ensconced in a cramped corner of our historic Bulfinch Building until being moved this year into larger and more modern quarters in the White Building.

More formally known as the Mallinckrodt General Clinical Research Center directed by Dr. Robert Neer, Ward 4's beds are reserved for patients with some type of metabolic illness which poses a challenge to medicine. Supported in the beginning by the Rockefeller Foundation and today by the National Institutes of Health Division of Research Resources, Ward 4 today continues basic work in such areas as diabetes, infertility, premature or delayed puberty, osteoporosis, abnormalities of calcium metabolism, Alzheimer's disease, depression, thyroid disease, and hypertension. Outpatient research is also conducted here. In the 1950s and 1960s, Ward 4 was the prototype for development of the NIH Clinical Research Center in Bethesda and the 75 other centers now operating under NIH support throughout the United States.

This year's much needed move to better quarters was made possible in part through the continuing generosity of the Mallinckrodt family, for which Ward 4 was renamed in 1949.

N271
BOSTON
Med Flight

A flying ICU capable of ranging througout eastern New England to deal with almost any medical emergency

First and latest ambulances

The original MGH ambulance was the first of its kind in Boston. It came on line in 1873, stocked with stimulants, opiates, and antidotes to all the common poisons, to be drawn by a powerful draft horse up and down Boston's then much steeper hills.

The ambulance made an appearance to publicize the International Fair, hosted by MGH employees, a major event in the Employee Capital Fund Drive. Prior to the fair, the original, horse-drawn ambulance made one final trip around the hospital grounds before going on permanent display in the lobby of the Wang Ambulatory Care Center.

It was a major sign of the times that at approximately that same moment the MGH was joining in a program with several other area hospitals to set up Boston Med Flight, an advanced life-support helicopter transport system staffed by a paramedic and a flight nurse—a flying ICU capable of dealing with almost any medical emergency from head and spinal cord injuries to burns and amputations. Where the original ambulance could serve just a few city blocks, the Boston Med Flight chopper will range over the whole of eastern New England to provide up-to-the-minute emergency care capability to a vast number of people.

Sarah Doherty

Sarah Doherty of Taunton was 13 in 1973 and a budding track star when an automobile struck her as she was bicycling. She lost her entire right leg.

Yet eleven years later she stood triumphantly atop Mount Rainier in Washington, waving her crutch and crying, "We're here, we're here!"—the first woman amputee to reach the peak of this mountain without the use of an artificial limb. And this past May, she climbed the highest mountain in North America, Mount McKinley in Alaska.

Miss Doherty's determination was apparent to Muffy Lutzin, an MGH Recreational Therapist, from the patient's first days in the hospital, when she startled the staff and other patients by standing on her head, just to show that she could do it. Soon she was captain of her high school swim team. Soon after that she took up skiing and became good enough to be crowned her division's handicapped skiing champion of New England.

Sarah moved to Seattle shortly after to work as an occupational therapist. It was there that she decided to become a mountain climber.

"I remember just standing there at the top of Mount Rainier," she says, "seeing how beautiful everything was. In a way, I felt that many other handicapped people were with me. It was a great feeling, just a great feeling."

The MGH's first ambulance makes a final sentimental whirl through Boston streets.

Balloons to close weak vessels

A college student in Greece lost the use of his left eye when his eyelid closed involuntarily and would not reopen. He was suffering from a weakness in the wall of his internal carotid artery. The artery blew up to more than an inch in size at the point of that weakness. This giant aneurysm or sac then pressed against the nerve controlling his eye muscles, locking his eyelid shut.

Aneurysms in this location are conventionally treated by clamping off the artery in the neck, but this can only be done if there is sufficient collateral circulation to maintain blood supply to the brain. In the student's case, tests conducted by specialists in Moscow (where he went first for treatment) showed that if the artery were clamped, he would die.

It was at this point that the student was referred to the MGH, where an innovative, two-step approach to this kind of problem had been successfully attempted.

In the first step, Dr. Roberto C. Heros, Chief of Cerebrovascular Surgery, used a superficial artery in the temple to create an arterial bypass for the weakened carotid. Then in the second step, with the patient under local anesthesia in a radiologic treatment room, Dr. Gerard M. DeBrun punctured an artery in the patient's groin and inserted, at the end of a catheter, a tiny deflated latex balloon. Dr. DeBrun then fed the balloon through the patient's arterial system until it was finally in position just upstream of the aneurysm. At that point he inflated it (with dye or iodinated contrast material) so that it fit snugly against the inner walls of the artery, closing it off permanently. The catheter was then removed, leaving the balloon in place. Relieved of pressure, the aneurysm collapsed, and the patient's eye reopened.

The college student was one of a number of patients to benefit from this treatment developed by Dr. DeBrun while he was in his native France and passed on by him to Dr. Kenneth Davis, Chief of Neuroradiology at the MGH, who worked with him to further develop the technique.

A caffeine insecticide?

The trouble with many insecticides is that they are harmful to humans and animals as well as to insects. But an insecticide that may be toxic only to its targets is perhaps on the horizon in the work of Dr. James Nathanson, Director of the Neuropharmacology Research Laboratory at the MGH and a well-known neurologist. The secret ingredient is caffeine.

Says Dr. Nathanson, "We knew that many plants, particularly tropical and subtropical varieties, contained large amounts of caffeine. Despite all of the research that has been done on caffeine in mammals, no one to my knowledge has ever determined why it is present in plants. Over time, plants have developed certain defenses to protect themselves against insects, and we suspected that caffeine might have been present for that purpose—as a natural insecticide."

In work reported this year in *Science,* Dr Nathanson proved that a variety of caffeine-based substances, sprayed on the leaves of tomato plants, inhibited the growth of hornworms that fed on them; in higher doses, the hornworms

control

caffeine

Laboratory dish (right) contains normal hornworm, while a similar hornworm (far right) is dying from a diet of caffeine.

died. Equally interesting, Dr. Nathanson discovered a synergistic effect between caffeine compounds and conventional insecticides, such that their combined use had an impact far beyond the sum of their parts. One known insecticide, for example, chlordimeform, became 10 times more potent when used with a synthetic caffeine compound.

Caffeine's effects on humans are abundantly studied and relatively well known. According to Dr. Nathanson, "The side effects of caffeine-like compounds appear to be relatively minor in humans and animals." But in insects, the caffeine compounds appear to inhibit the production of an essential enzyme, a substance without which cells cannot break down their communication products. Hornworms that fed on leaves sprayed with caffeine compounds became uncoordinated and hyperactive, displayed tremors and lost their appetites. Mosquito larvae became too uncoordinated to swim. Unable to reach the water's surface for air, they drowned.

Dr. Nathanson's next steps are to develop more potent caffeine derivatives and then combine them with compounds that will affect hormones found only in invertebrates.

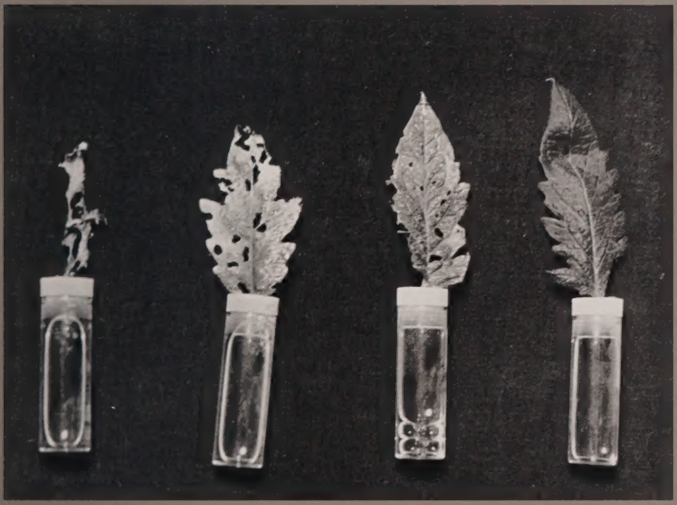
Dr. Nathanson's research is unusual because he himself took it from basic science which satisfies fundamental scientific curiosity to practical application. Most basic researchers leave it to other investigators to find and develop practical uses. Basic research is the underpinning which often leads to many practical applications.

The MGH was one of four institutions this year participating in a $40 million research program in the medical application of the free-electron laser, or FEL. The FEL is a potentially revolutionary device that may expand the frontiers of medicine, biology, and the study of the microstructure of materials.

The MGH team, headed by Dr. John A. Parrish, Director of the Wellman Research Laboratory, and including scientists at Massachusetts Institute of Technology, Harvard Medical School, and the Massachusetts Eye and Ear Infirmary, will study the interaction between FEL light and tissue and FEL's use to the physician. The FEL generates light by electron acceleration and is unique in its tunability, its high power, and its short pulse length—features that may lead to important diagnostic and therapeutic advances.

The MGH Wellman Research Laboratory is the world's largest laboratory committed to medical laser research. The addition of the free-electron laser will bolster an already formidable scientific capability.

The FEL project is financed by act of Congress which instructed that the funds be provided by the Strategic Defense Initiative Organization of the U.S. Department of Defense; it is administered by the Organization of Naval Research. However, the MGH participation in the FEL program is based on our tradition of complete scientific control and freedom of disclosure; the MGH will engage in no classified research at all.



Doses of a caffeine-based substance sprayed in increasing amounts (from left) on a series of tomato plants showed the lethal effect of caffeine on hornworms which had fed on the leaves.

Only a few years ago, like the free-electron laser today (previous story), it was just a research concept; but the neodymium YAG laser has now become one of the most powerful lasers available in medical care. It has proved especially effective in the treatment of cancers of the esophagus and the bronchi. One MGH patient this year, for example, with an esophageal tumor so constrictive that he could not swallow his saliva, was able to eat a bowl of thick soup the day after being treated by the neodymium YAG (for yttrium aluminum garnet, an artificial diamond) laser.

The YAG laser offers hope to patients suffering from cancer of the esophagus and bronchi.

Dr. James Richter, Chief of the MGH Gastrointestinal Clinic, emphasizes that YAG treatment is not a cure. The tumor almost always grows back. But in the past, many patients with a cancer-blocked esophagus have died within months, not from the tumor but from the effects of malnutrition.

We expect to treat eventually about fifty cancer patients a year with YAG. We are also considering extending the YAG laser to treatment of certain lung disorders.

The MGH Institute of Health Professions began in 1980 because a multitude of changes had occurred in the general domain of health care, and it was time to restructure the educational process.

The year 1985 saw the IHP's first graduating class in nursing, and the class members drew high praise from Elizabeth M. Grady, Ph.D., RN, whose contribution to the IHP was recognized this year by her appointment as director of its Graduate Program in Nursing. Said Dr. Grady, "This class, with its diversity, unleashed boundless energy on an evolving academic system. The Institute's organizational culture has been influenced significantly by the students present during the last three years." Hailing from a variety of backgrounds, including teaching, secretarial work, biology, farming, and family counseling, the graduates brought to their profession valuable life experiences as well as a solid education and a strong patient care background.

The Institute also acquired this year its first president—Dr. Stephen N. Collier, who also assumed the position of John Hilton Knowles Professor of Health Policy at the Institute. Dr. Collier's Ph.D. in political science bespeaks his career-long interest in health-care policy, planning, and administration. He had held a large number of health and academic positions, chiefly in the Southeast, and earlier this year was named the first Allied Health Policy Fellow by the American Society of Allied Health Professions.

During the past several years, Dr. Collier was professor and Associate Dean of the School of Community and Allied Health at the University of Alabama in Birmingham. He brings to the MGH Institute an impressive record in directing resource development, academic affairs, professional relations, and accreditation activities.

Dr. F. Sargent Cheever, MGH Vice-President, presents degrees at the 1985 graduation of the Institute of Health Professions.

Yvonne Munn

Yvonne Munn began her career in nursing in the early 1950s, first as a science instructor at the Edmonton General Hospital School of Nursing, then as Educational Director of the Medicine Hat School of Nursing in Medicine Hat, Alberta. She came to the United States in 1956 to serve 12 years at Sharp Memorial Community Hospital in San Diego, latterly as Assistant Director of Nursing. In 1968 she joined Rush-Presbyterian-St. Luke's Medical Center in Chicago where she was Assistant Vice-President for Nursing and Associate Dean of the Rush College of Nursing. In 1977, she went to the 1,121-bed Methodist Hospitals of Dallas, where, in 1982, she was named Vice-President of Patient Systems and Evaluation. During this tenure, she was elected to the post of President, American Society of Nurse Administrators, a national organization for nurse executives. Mrs. Munn holds a master's degree in nursing from the University of California at San Francisco.

This past year, Mrs. Munn came to the MGH as our new Director of Nursing, also accepting appointment as an MGH Associate General Director. We are delighted to welcome her to New England. As the president of Dallas Methodist wrote of her, "Mrs. Munn's accomplishments have been recognized by our physicians and patients and have brought her and our nurses national acclaim for their outstanding contributions to the development of clinical nursing and the retention of qualified staff."

Patricia Baldridge

Yet another new player at the MGH this year is Patricia Baldridge, named Director of Clinical Services, who joins us from the Michael Reese Hospital in Chicago, where she was Associate Vice-President for Professional Services. Miss Baldridge held a similar position previously at The New York Hospital-Cornell Medical Center.

Dr. Edward E. Heller

A computer systems specialist in health care information management has joined the MGH as Director of Information Resources.

Dr. Edward E. Heller, who holds a medical degree from Stanford and a master's in business from M.I.T., is coordinating the activities of the MGH's various computer groups in the innovative extension of computer systems into hospital-wide applications. These applications will provide support to the delivery of patient care, which can derive important direct benefit from this technology.

During the past several years, Dr. Heller served as president of Heller Associates, a consulting firm in the field of medical information management, and in various vice-presidential capacities with Spectra Medical Systems, Inc., and a parent company, Medicus Systems Corporation.

Dr. Heller cofounded Spectra, a pioneer in the use of computers to streamline the work of the physician, the nurse, and other staff throughout the hospital.

Systems designed by Dr. Heller eliminated many of the manual steps formerly required of the doctor in conveying patient care instructions and maintaining a profile of a patient's progress.

Without elaborate preparation, such as the need to learn and implement codes, the physician could use a terminal to order medications for a patient, the hospital pharmacy would automatically fill the order, and, through the same information system, nurses attending the patient would be kept alerted to any changes in the schedule for administering the drugs.

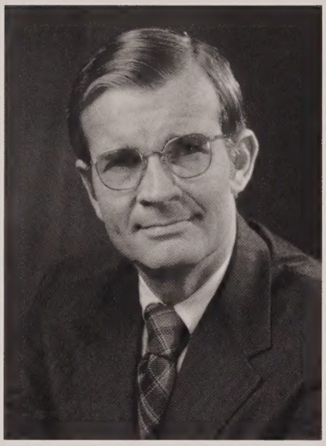
In addition to designing computerized health care management systems, Dr. Heller helped to oversee the development and testing of these systems and for five years directed a team which operated nationwide to market and install the products in medical centers.

Evelyn Bonander

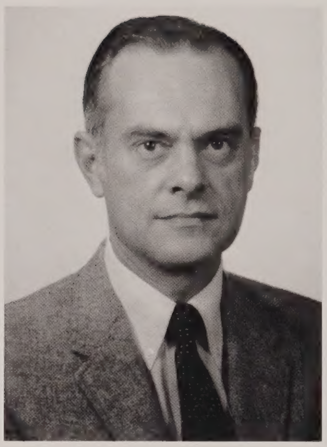
Evelyn Bonander is our new Director of Social Service, joining us from Barnes Hospital and Washington University Medical School in St. Louis, where she was Director of the social work programs at both institutions for 13 years. In 1984 she served as President of the National Society of Hospital Social Work Directors. She has been especially committed to the organization of patient mutual-support groups as a way to extend the hospital's ability to care for patients beyond its walls without imposing a new burden on health-care costs.

"People can learn so much from each other," says Miss Bonander. "And we, as social workers, learn a great deal from patients. They can be our greatest teachers."

Dr. F. Dennette Adams, whose medical career spanned more than 55 years at the MGH, died this year just short of his 92nd birthday. This "physician in the grand old MGH style," as a colleague characterized him, graduated from Princeton in 1913 and from Harvard Medical School in 1917. He joined the MGH as an intern the next year and spent the remainder of his career with us, leaving only to serve as a first lieutenant in the Medical Corps during World War I, a full colonel during World War II, and an inspector for the U.S. Army Surgeon General in the Korean War. In 1967, the U.S. Army honored him with the title of Consultant Emeritus in Medicine. Dr. Adams was an internist. For many years he edited *Physical Diagnosis,* a standard text here and abroad. A former assistant professor at Harvard Medical School, he was one of the first modern physicians to recognize the impact of employment, nutrition, and recreation—what we now call "life-style"—on a patient's health. During the 1930s he established at the MGH what we believe was the world's first headache clinic.



Dr. Stephen E. Hedberg, Senior Endoscopist at the MGH and Assistant Clinical Professor of Surgery at Harvard Medical School, died at age 54 this year after an acute episode of a chronic illness. Born in Boston and educated at Phillips Exeter Academy, Harvard College, Harvard Medical School, and, in surgery, at the MGH, Dr. Hedberg won world renown in the early 1960s for his innovative work in the field of fiberoptic endoscopy. He was an ardent outdoorsman and a trained athlete who ran in the Boston Marathon several times and was a member of the celebrated Harvard crew of 1950, winner of the Grand Challenge Cup in England.



Dr. Jack R. Dreyfuss, MGH Radiologist and Associate Clinical Professor of Radiology at Harvard Medical School, died at age 61 this year at his Brookline home after a long battle with cancer. Dr. Dreyfuss was considered one of the country's outstanding gastrointestinal radiologists. One of his most productive ideas was to reproduce the patient's symptoms by feeding prior to examination, following the course of digestion through the tract, and thus identifying a certain food, maneuver, or sequence of events to be at the root of the patient's problem. His skill at the interpretation of radiological data was attested to by the several texts he authored or edited, including his most important work, *Radiology of the Colon.* Said one of his colleagues, "He would often disclose remarkable results that no one else could find by any other means. He had few peers."

Louise Hatch, Director of the MGH Department of Dietetics for 30 years until her retirement in 1979, died this year after a long illness. Born and raised in New Bedford, Miss Hatch was educated at the Pratt Institute and Columbia University and completed her dietetic internship at Beth Israel. Her first staff appointment took her to Cornell University Medical Center. From there, in 1945, she joined the MGH. Miss Hatch held several state offices and was honored in 1976 with the Marjorie Hulsizer Copher Award, the highest honor bestowed on a member of the American Dietetic Association.

Dr. Carl F. Cori, former Visiting Biochemist at the MGH and Visiting Professor of Biological Chemistry at Harvard Medical School, shared a Nobel Prize with his wife, Gerty, in 1947 for their work in the isolation and synthesis of phosphorylase, an enzyme that helps the body convert the animal starch, glycogen, into sugar. Dr. Cori was remembered by an MGH colleague as "perhaps the most scholarly person I have ever met. He had a broad knowledge of human endeavor that was truly remarkable."

Edna S. Lepper, former Director of Nursing at the MGH, saw many changes in her profession in her long career; and before her retirement in 1968, she played a hand in the effort to make them changes for the better. She was the first nurse to be appointed to the Council on Professional Practices of the American Hospital Association. She was the first nurse named to the U.S. Public Health Service Committee on Hospitals and Clinics. She conceived the MGH's Unit Coordinator Program and the hospital's Dispatch Service, easing the administrative burden on nurses and freeing them for more time with their patients. A native of Attleboro, she died this year at age 83.

Our *Good Housekeeping* Award

Good Housekeeping magazine polled experts across the country this year and as a result of their findings named the MGH as the nation's best general hospital. In addition, three other hospitals closely associated with the MGH were chosen among the top three in listings of specialty hospitals: Shriners Burns Institute, staffed solely by MGH physicians, was named the best burn center in the United States. McLean Hospital in Belmont, owned by the MGH Corporation, was listed as second best psychiatric hospital in the nation (after the Menninger Foundation of Topeka, Kansas).

And Massachusetts Eye and Ear Infirmary, adjacent to and sharing space and consulting physicians with the MGH, was chosen third among eye hospitals. The Anne Bates Leach Eye Hospital in Miami and the Wilmer Eye Institute of Baltimore tied for first.

Another Boston specialty hospital, Children's Hospital, was named best children's hospital. All five Greater Boston hospitals are affiliated with Harvard Medical School, as is Brigham and Women's Hospital, which finished seventh in this poll.

Good Housekeeping interviewed 250 medical directors, chiefs of staff, department chairmen, and hospital presidents and vice-presidents at major medical centers across the country. The sole question asked was, "Which hospitals—other than your own—do you consider most outstanding in terms of patient care?"

The General Hospital Corporation

Excerpts from audited financial statements (in thousands of dollars)

Income	1985*	1984**
From patient care	$330,744	$299,967
Less free care and contractual allowances	60,080	42,430
	270,664	257,537
Research and other specific purposes	78,261	79,890
Other	14,417	13,561
Total Operating Revenue	363,342	350,988

Expenditures

For operating expenses: Salaries and related compensation	$185,977	$174,759
Supplies, expenses, depreciation	110,814	104,388
	296,791	279,147
Research and other specific expenses	64,163	69,950
	360,954	349,097
Surplus (Loss) from operations	2,388	1,891
Endowment and other income	956	926
Surplus (Loss)	3,344	2,817

*Year Ending September 30, 1985

**Certain amounts in fiscal year ending 1984 have been reclassified to permit comparison.

The Hospital's Dollar

Diagnostic and Therapeutic Services: Diagnostic services, therapeutic services, house staff and professional staff, drugs, supplies, etc.	47.8%
Nursing Care	15.6%
Plant and Equipment: Depreciation, interest, energy, telephone, maintenance	12.7%
Room and Board Services: Food, laundry, security, housekeeping	7.8%
Administrative Services: Computer, accounting, administrative salaries, etc.	16.1%

Massachusetts General Hospital

Facts and Figures

October 1, 1984–September 30, 1985	
Beds	1,082
Number of Admissions	32,168
Number of Ambulatory Visits	497,250
Inpatient Surgery	17,492
Emergency Ward Visits	69,276
Day Surgery	8,143
Active Staff	1,507
Clinical Fellows	324
Residents	404
Research Fellows	219
RNs	1,029
LPNs	107
Nursing Assistants	73
Volunteers	874
Employees	8,000+

The Massachusetts General Hospital
as of 12.31.85

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as of 12.31.85

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Ways of giving

From its founding in 1811 to the present, the Massachusetts General Hospital has been a monument to the generosity of private citizens. The simplest method of giving to the hospital is the gift of cash, but it is also possible to give securities, personal property, real estate, or life insurance. In addition, many companies have matching gift programs that double or even triple the value of a gift given to the MGH.

For an individual who has a greater annual income than is needed for current expenses, a *Charitable Lead Trust,* or the contribution of an "income" interest made by a transfer of property into a trust, may be appropriate.

It is also possible to take advantage of the various Life Income Plans offered by the hospital. The *Pooled Income Fund,* for instance, is a trust in which contributions of many donors who have retained life interests are pooled, operating in a fashion similar to a mutual fund. Other life income plans tailored to the specific needs of the donor are available.

Benefaction through bequests has played a vital part in the growth and development of the MGH. Funds may be left in the form of a *cash bequest; a bequest of all or a stated percentage of the residue of an estate; or a bequest of a remainder annuity trust or unitrust.*

Should you plan to include the hospital in your will, or should you be interested in one of the types of gifts described, the hospital could suggest to you or your lawyer specific wording for carrying out your wishes. Please contact Herbert P. Dane, Director of Capital Campaign (telephone: [617] 726-2200), with any questions regarding your gift to the MGH.

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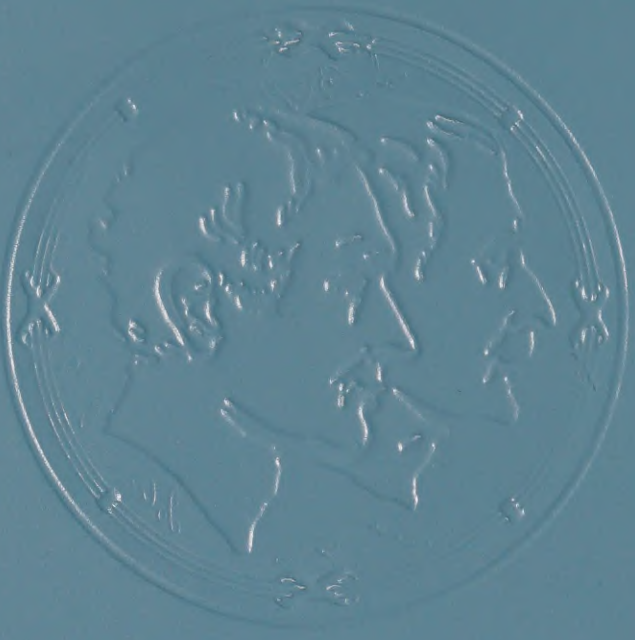
Fruit Street
Boston, MA 02114

Annual Report 1986

Massachusetts General Hospital

Shown on cover, the Trustees Medal bears the likenesses of the MGH's cofounders, Dr. James Jackson, its first physician, and Dr. John Collins Warren, its first surgeon. See page 6.



2 Looking ahead

6 Anniversaries

8 Cancer

11 Transplantations

12 Heart

18 Women

18 Of joints and bones

22 Of depression, narcotics, and pain

24 New things and new faces

28 Finance, figures, facts

In presenting my report for the year 1986, I should like to begin with a brief description of the changes which have, during the past few years, gradually taken place in the corporate organization of the Massachusetts General Hospital. The major important result of these changes is that more capable and talented people are now involved in the complex affairs of the MGH and its affiliated institutions at the Trustee or policy-making level.

The Board of the Institute of Health Professions under the chairmanship of Mrs. E. Lorraine Baugh now includes, in addition to Dr. Collier, Dr. Buchanan and representatives from the parent company board, Mrs. Helen H. Gilbert, Mrs. Helène K. Sargeant, and the Rev. Peter J. Gomes, as well as Henry J. Mankin, M.D., the Chief of Orthopaedics, and F. Sargent Cheever, M.D. and Nelson J. Darling, Jr., Esq.

The Board of Spaulding Rehabilitation Hospital, chaired by Lawrence E. Martin, Associate General Director of the MGH, consists of David L. Rosenbloom, Ph.D., Mrs. Helen B. Spaulding, John V. Woodard, Esq., and Stephen M. Weiner, Esq., as well as Dr. Buchanan and three members of the parent board.

The Board of McLean Hospital chaired by George Putnam (the first time that this board has been chaired by someone other than the MGH chairman) now includes Mrs. Lewis S. Dabney, William I. Koch, Mrs. Martha S. Mugar, and Mrs. Norman L. Cahners, as well as F. Sargent Cheever, M.D., Drs. de Marneffe and Frazier and six members of the parent board.

Thomas W. Stephenson of Chestnut Hill has replaced John L. Cooper on the parent company board, Mr. Cooper having retired but becoming an Honorary Trustee of the General Hospital in recognition of his devoted and valuable service.

The General Hospital Board, in addition to all the parent company board members and Dr. Buchanan, now has as members Alexander V. d'Arbeloff, Henry L. Foster, D.V.M., Thomas J. Galligan, Jr., Francis W. Hatch, Jr., Peter H. McCormick, and Mrs. Karl Riemer.

Most of the major policy decisions are now made by the boards of the constituent institutions, and it is gratifying to have such outstanding community leaders on the team.

Fiscal 1986, which I thought would be a true crisis year for us financially since the original budget projections put us more than ten million dollars in the red, finished slightly in the black thanks to hard work on everybody's part and a few breaks. I am reasonably optimistic that we will wind up fiscal 1987 somewhere near in balance, but I am convinced that we will never return to what in retrospect were the days of milk and honey — reimbursement for reasonable cost.

Even if there is a successful effort, which I believe there will be, to block the deepest and most dangerous proposed cuts in reimbursement, the most we can hope for in the foreseeable future is that reimbursement will cover the expense of care of the covered patient, period. Hospitals, and particularly urban teaching hospitals, have historically used excess patient care revenues for three purposes — care of the indigent, teaching, and research. It is conservatively estimated that there are now more than thirty-seven million people not covered by any form of health insurance, a number which has been rising rapidly. Who will pay for their care? We have funds that yield more than eight hundred thousand dollars a year that are devoted to this purpose; in 1986 we spent twenty-three million on free care and bad debts. Fortunately one of the good features of the Massachusetts laws is that a free care pool is created by the insurers and Massachusetts employers. If it were not for that, we would be running a deficit which would be putting us into bankruptcy in not too long a time. Many states have no such provisions, and many states and many hospitals simply don't take adequate care of the poor. We have never closed our doors to the indigent, and we are determined that we never will, but we do not have and never will have, without help, the resources to take care of all who come to us. This is a problem that has to be addressed, and long term I can see no pocket big enough to provide these resources except that of the federal government.

As Dr. Buchanan points out in his report, the ability to subsidize teaching and research out of the patient care budget will simply not exist in the future. New sources of funding will be necessary. Unfortunately for me my term as Chairman has coincided with the capital campaign at the MGH to rebuild our obsolete patient facilities. I say unfortunately because, as you all know, nothing is more boring or more difficult than raising money for bricks and mortar. But nothing is more important, either, and the program money and the research money will start to dry up if we cannot provide a decent environment — not fancy or luxurious but adequate and decent — for our patients, our staff, and our employees. Gifts and pledges to the capital campaign now total in excess of one hundred fourteen million dollars. We have fifty-five million to go and three years to do it in. We have a first-class development office, strengthened by the appointment in 1986 of William E. Walch to direct Resource Development, and I am confident that we will succeed.

We have just completed arrangements, after lengthy and soul-searching negotiations, for the lease of a large amount of space in the Charlestown Navy Yard to provide additional space for our expanding research community. Industrial support of research expenditures has risen from $4.8 million in 1982 to 9.3 million in 1986. During the same period support from foundations grew from 3.2 to 6.8 million, and from endowment funds and gifts from 3.7 to 6.4 million.

Recognizing the need for special kinds of housing for our growing senior population, we have taken a major step toward establishing a life care community in Westwood. We hope to develop that program into an outstanding self-contained home for the retired.

Elsewhere you will read a summary of the yearlong 175th anniversary celebration by the MGH, the General, and McLean.

McLean this year welcomed Dr. Shervert H. Frazier back from Bethesda, Maryland, where he had been serving as the Director of the National Institute of Mental Health. After a two-year leave of absence, Dr. Frazier returned to McLean as Psychiatrist in Chief and head of the Harvard Medical School Department of Psychiatry at McLean. We are grateful to have had Dr. Alan F. Schatzberg as interim Psychiatrist in Chief during Dr. Frazier's absence.

The inaugural year of McLean's joint venture with American Medical International, Inc., McLean Health Services, Inc. (MHS), has been promising. McLean Health Services' growth has been rapid with demand expanding in four separate services: Employee Assistance Programs, Community Residential and Treatment Services, Contract Psychiatric Management Services, and Drug Screening/Educational Services. Currently, MHS has contracts in place or in the developmental stages in Massachusetts, New Hampshire, Northern New Jersey, Delaware, Philadelphia, Baltimore, Cleveland, Washington, Atlanta, and Los Angeles.

We are delighted that the Graduate Program in Nursing at the MGH Institute of Health Professions has received its accreditation by the National League of Nursing. And a major gift to Dr. John Locke's neurolinguistics laboratory has been a welcome event.

Spaulding Rehabilitation Hospital has continued its march toward becoming the premier rehabilitation hospital in the country. It looks to the 1987 fiscal year with plans to add a vitally needed area for patient and ancillary services.

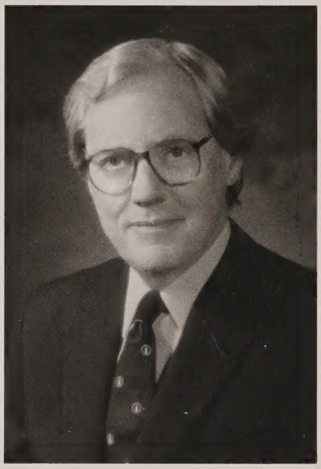
The fiscal year 1986 has therefore been a useful and productive year in many ways. Although the health care environment remains difficult and extremely volatile, making forward planning a frustrating exercise, I have great confidence in the ability of the administration under the dynamic leadership of Dr. Buchanan to find a path through the many thorn-bushes placed in our way by the numerous bureaucracies with which we are constrained to deal. We have a brilliant and imaginative staff, loyal and capable employees, and strengthened and hard working Boards of Trustees, and I am convinced that our distinguished past will be succeeded by an even more distinguished future.

This will be my last report as Chairman, but I intend to continue to work for the MGH as my capable and energetic predecessors, John E. Lawrence and F. Sargent Cheever, M.D. are presently doing.

Francis H Burr

Francis H. Burr, Esq.

General Director



In spite of a general reduction in the utilization of hospital services, the demand for care at the MGH remains strong. The blend of the brilliant, inquiring young minds of our medical students and physicians-in-training with the superb senior clinicians and investigators drawn to our patient care and research programs creates the promise and reality of tomorrow's diagnosis and treatment. Indeed, much of what we are able to offer the public are the benefits of our teaching and research programs.

Ironically, we are now gravely concerned that educational and research programs such as ours will no longer get the kind of support that the federal government has traditionally given. Accordingly, we must increasingly look to innovative and nontraditional ways to generate revenue to support our most valued and distinguishing programs. The proposed federal budget would reduce support for graduate medical education in two ways. Both are through Medicare, the federal program that reimburses health care providers for the cost of caring for the elderly. One would reduce the portion of Medicare reimbursement that covers the direct expense of supervision, administration, and teaching of young physicians-in-training. The other is to cut in half the adjustment for the severity of illness and other costs unique to the nation's teaching hospitals. This latter would reduce our revenues by about six million dollars.

Another issue in the whole arena of graduate medical education has to do with the numbers of physicians that are trained in the specialties and subspecialties compared to the number trained in what are generally termed general or primary care disciplines. I do not believe that any institution, no matter how great or renowned it is for graduate medical education, will ultimately escape some reduction or restriction in emphasis on subspecialty training.

In spite of these threatening forces, I see a very real need for the continuation of our historic commitment to graduate medical education both in the specialty and general areas. Whatever the programmatic distribution of our physicians-in-training, the quality and sophistication of the care we offer our patients are heavily dependent upon the participation of these residents or house officers, as they are called.

Because I have considerable concern about the future funding of physician training programs, I have been willing to look at new enterprises that have potential for revenue generation. Indeed, I am convinced that such revenues may prove to be absolutely critical to the continuation of our educational and research missions, and thereby our preeminence in care of patients. Even with creative new ventures, however, I find it difficult to believe these vital educational endeavors can survive without significant continuing federal support.

Another group of training programs that are threatened are those that prepare allied health personnel: the technical and special support personnel who are often inappropriately taken for granted. These are the people who do renal dialyses, run heart-lung machines, run complicated imaging equipment and provide similar essential services throughout the hospital. We are finding that these people are becoming scarcer and scarcer, particularly in our Massachusetts economy with unemployment at exceptionally low levels. As always happens in times of scarcity, wage scales are escalating, thus creating new problems for cost containment and a greater demand for new revenues. And that particularly applies to nursing. As women have been granted greater career opportunities and as the pool of college age young people shrinks, we are witnessing a decline in the number of people entering nursing schools and nursing degree programs.

With a parallel dwindling number of applicants to medical school, it is appropriate to ask ourselves if the MGH is continuing to attract the quality of applicants who have the capacity to maintain its exceptional performance standard in patient care and biomedical research. Were we to lose that quality at the entry point to the profession, it would be a tragedy. Indeed, one of the advantages our country has at the moment is a substantial preeminence in biomedical research, the potential humanitarian benefits of which are great. That lead role also carries extraordinary potential to position our country advantageously both politically and economically in the growing international competition.

It is in the context of all these changes that we have the need to involve ourselves in activities and programs that some may view as nontraditional and even inappropriate. In Mr. Burr's report you have seen reference to our developing Life Care Program for the elderly in Westwood. We have joined New England Medical Center and Caremark, Inc. to provide high technology home care for people who would otherwise have to remain in more costly hospital beds. The income potential of certain of our real estate holdings is being assessed, and a variety of other business opportunities arising from our biomedical research and biomedical engineering programs are being evaluated. Whenever feasible, I hope that our quest for new revenues will lead us to programs closely related to those in which we have traditionally engaged. Certainly, they must never be antithetic to our mission but rather there should be discernible complementarity and synergy between any new venture and the MGH's traditional programs. And most important is the immutable requirement that whatever we do, whatever comes to be associated with the MGH name, must be in its unique way of the same quality and excellence as the programs for which the institution is renowned.

Robert Buchanan. MD

J. Robert Buchanan, M.D.

The most important anniversary we observed this year was our **175th birthday.** We opened this yearlong event with Charter Day on February 25, 1986. On this date in 1811 the MGH and McLean Hospital received their charter from the Great and General Court of Massachusetts. To commemorate the anniversary several physicians from the two institutions described examples of recent patient care. Gasps of amazement escaped from many in the audience as words and color slides demonstrated achievements not possible a little more than a decade ago—let alone 175 years ago.

On November 13 the last major event of the celebration took place. Friends of the MGH family of hospitals (among them Governor Michael S. Dukakis, Bernard Cardinal Law, The Right Reverend David E. Johnson, Rabbi Abraham Halbfinger), and distinguished MGH alumni from as far away as London attended a ceremony in which the MGH Trustees gave their **first annual Trustees Medal** to four physician-scientists whose careers have made major contributions to humankind, especially through the advancement of medical practice and care.

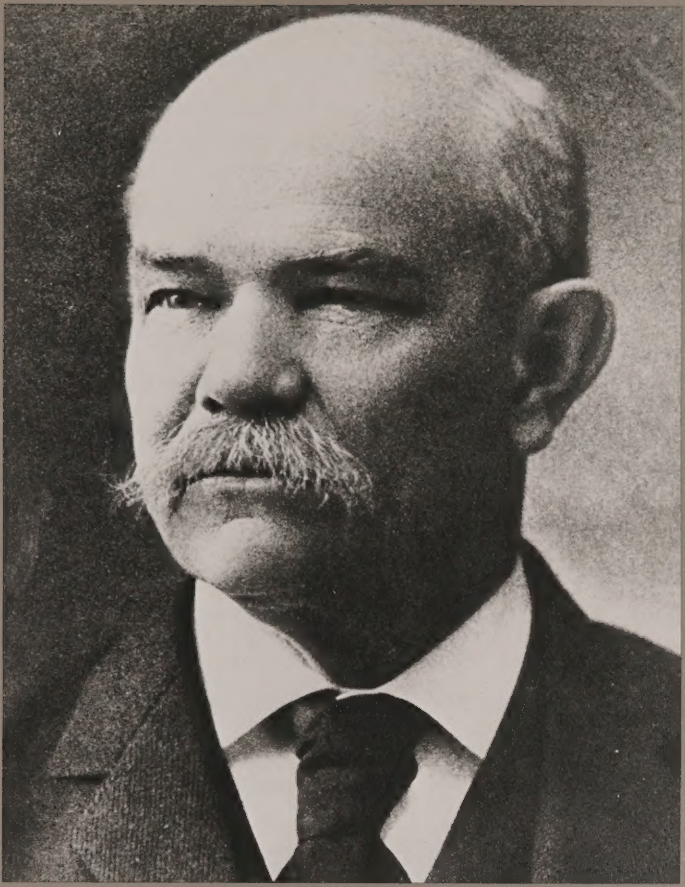
Two of the awardees, Michael S. Brown and Joseph L. Goldstein, who shared one of the Trustees Medals, first met in the 1960s when they trained as residents at the MGH. Their scientific collaboration culminated in sharing the 1985 Nobel Prize in Physiology or Medicine for advancing understanding of cholesterol metabolism and opening new approaches to treating heart disease. James A. Shannon, a gifted scientist in his own right, made possible the biomedical explosion of the last three decades when as Director of the National Institutes of Health from 1955 to 1968 he carved out major increases in support of research. Norman E. Shumway of Stanford University Medical Center, more than any other man, brought forth the era of cardiac transplantation.

Each year, when at least one suitable candidate can be determined, the trustees will present up to three Trustees Medals to outstanding physicians and scientists. The award, established this year, commemorates the 175th Anniversary.

McLean Hospital also celebrated its 175th Anniversary at the "Discover McLean" Open House on October 26, 1986. Following a cornerstone ceremony at the hospital's new inpatient unit, local community members joined the McLean staff, state and civic leaders, and representatives of the MGH family of executives at more than forty different seminars, films, tours, and exhibits.

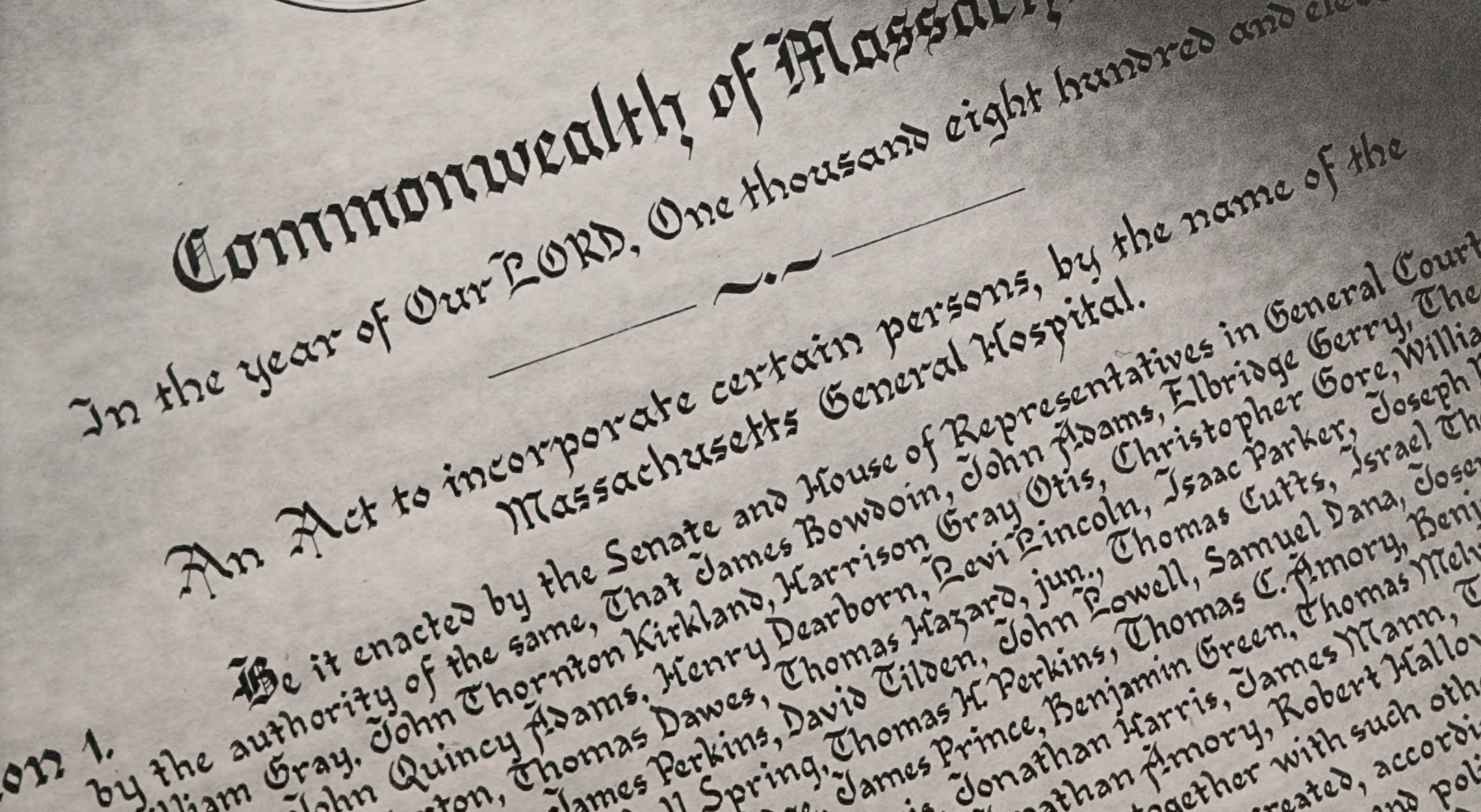
A Hundred Years of Appendicitis. The two-inch-long structure we call the appendix was depicted in late fourteenth-century anatomical drawings and was known to anatomists for centuries before that. But it was not until 1886 that the appendix was identified as the seat of the usually fatal abdominal disease then called *typhlitis*, meaning inflammation of the cecum, the part of the large intestine to which the appendix is attached. The autopsy of the typhlitis victims has always disclosed a diseased appendix, but until 1886 this was regarded as the effect of a primary infection in the intestine. Now came this new analysis purporting to show that the primary disease emerged from the appendix and that it was the rupture of the appendix that made the affliction fatal.

In recommending that the Massachusetts General Court approve the MGH charter in 1811, a legislative committee said that the hospital "is intended to be a receptacle for patients from all parts of the Commonwealth, afflicted with diseases of a peculiar nature, requiring the most skilful treatment, and presenting cases for instruction in the study and practice of surgery and physic. Among the unfortunate objects of this charitable project, particular provision is to be made for such as the wisdom of Providence may have seen fit to visit with the most terrible of all human maladies—a deprivation of reason. . . ."



Dr. Reginald H. Fitz, who recognized the true nature of appendicitis in 1886 and paved the way for surgery that cured this and other abdominal diseases

Presented in 1986 were the first MGH Trustees Medals, honoring physicians and researchers who have made contributions benefiting humankind.



Commonwealth of Massachusetts

In the year of Our LORD, One thousand eight hundred and eleven.

An Act to incorporate certain persons, by the name of the Massachusetts General Hospital.

on 1.

Be it enacted by the Senate and House of Representatives in General Court
by the authority of the same, That James Bowdoin, John Adams, Elbridge Gerry, The
illiam Gray, John Thornton Kirkland, Harrison Gray Otis, Christopher Gore, Willia
ohn Quincy Adams, Henry Dearborn, Levi Lincoln, Isaac Parker, Joseph
ton, Thomas Dawes, Thomas Hazard, jun., Thomas Cutts, Israel Th
James Perkins, David Tilden, John Lowell, Samuel Dana, Jose
ll Spring, Thomas H. Perkins, Thomas C. Amory, Benj
James Prince, Benjamin Green, Thomas Mel
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athan Amory, Robert Hallo
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The occasion of this stunning new diagnosis and of the introduction of the new term *appendicitis* was the inaugural meeting in Washington, D.C., on June 17, 1886, of the Association of American Physicians. The author of the paper that had such a major impact was an MGH pathologist, Dr. Reginald H. Fitz.

Dr. Fitz's challenge to his learned audience that day went beyond his discovery of appendicitis (a word he coined). Even more radical was his proposal that the disease be treated *surgically.* Until that day, with few exceptions, surgeons were taught not to open the abdominal cavity. No surgeon of the 1880s could guarantee that abdominal surgery would not result in new and worse infections.

But abdominal surgery of the kind being proposed by Dr. Fitz had become thinkable because there was (and still is) no test to identify appendicitis. Without surgery a victim of appendicitis would die. Building on this, Dr. Fitz's proposal that appendicitis be treated by the surgeon was implicitly a proposal to redefine surgery itself. A century of great progress in the art of abdominal surgery was to be dated from that moment.

Cancer

We cherish also, of course, many simpler anniversaries. Twenty-five years ago, for example, we introduced the use of the **cyclotron** in the treatment of certain kinds of endocrine disorders. More recently, proton-beam radiation also proved effective against hard-to-treat cancers, such as those arising near the spinal cord.

And it was 10 years ago this year that we opened the **MGH Cancer Center** in the Cox Building. Its physicians now see more than 3,000 new cancer patients a year and provide follow-up care to another 7,500. The facility is one of the world's most advanced centers for cancer care. Its staff is involved at the same time in front-line cancer research, sometimes in efforts with other research labs. For example, the Pediatric Surgical Research Laboratory and Biogen, Inc., of Cambridge, Massachusetts, and Switzerland coreported this year their success in synthesizing human Müllerian Inhibiting Substance (MIS), a protein basic to sex differentiation in the embryo and thought to be **a potential weapon against cancers of the female reproductive system.** The quantities of MIS now made possible through the MGH-Biogen program will allow research to move ahead much more rapidly in this area.

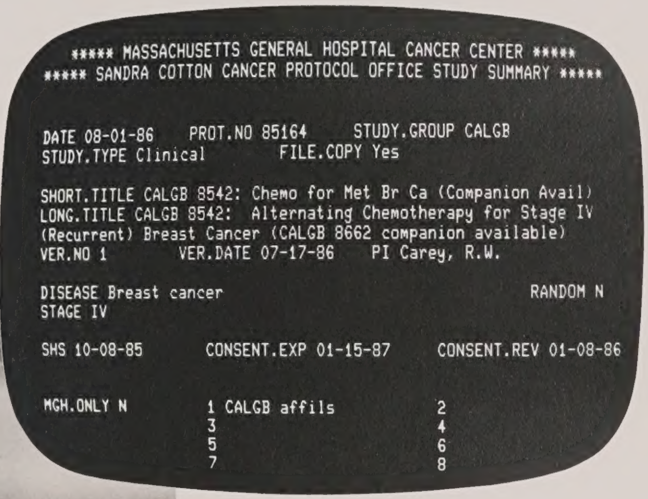
The MGH Cancer Center this year also announced that its investigation of **a potential new treatment for lung cancer** had moved into the preliminary stage of patient trials. This treatment is based on the clinical observation that larger numbers of lymphocyte cells at the site of a cancerous tumor may provide a more powerful defense against it than do smaller numbers. An MGH team developed a method to extract the patient's own lymphocytes, synthesize them in vast quantity through biogenetic techniques using **Interleukin-2,** then restore the enhanced lymphocytes to the body, where they seek out the tumor. Some of the enhanced fighter cells react immediately, in the words of one MGH researcher, "by literally blowing up the tumor as you would burst a balloon." Others have a delayed-action effect. MGH physicians stress that this treatment remains experimental and that they must study a large number of patients before determining its

Each tiny bottle of Interleukin-2 contains one milligram of the experimental, anticancer drug, an amount equal to one day of treatment per patient.

effectiveness; but we were able to report this year that all five of the inoperable lung-cancer patients so far treated with their own enhanced lymphocytes have shown some, though not permanent, improvement. Our researchers have also noted that, in principle, this method can ultimately be applied against all cancers.

Another cancer treatment under development at the MGH Center and announced in 1986 involves the use of cisplatin, considered **one of the most effective cancer drugs** to be developed in the past few years, along with another drug, known as 5 fluorouracil, which is also a chemotherapeutic agent. Using this combination in the treatment of head and neck tumors, MGH researchers report a marked improvement over previous regimens in the response of tumors, some of which have completely disappeared. Researchers also have developed an antinausea regimen, which has greatly reduced the nausea and vomiting from which patients often suffer when taking cancer chemotherapy.

It was five years ago that Sandra Cotton died of cancer after a struggle in which she had become one of our especially memorable patients. To mark the anniversary of her death and to honor her family's support for the MGH, the Cancer Center held a ceremony this spring in which it named its Protocol Office after her and unveiled a carved wall plaque bearing her name. The **Sandra Cotton Cancer Protocol Office** provides centralized access to data on the wide variety of cancer studies being conducted at the MGH.



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   ***** MASSACHUSETTS GENERAL HOSPITAL CANCER CENTER *****
***** SANDRA COTTON CANCER PROTOCOL OFFICE STUDY SUMMARY *****


DATE 08-01-86    PROT.NO 85164     STUDY.GROUP CALGB
STUDY.TYPE Clinical        FILE.COPY Yes

SHORT.TITLE CALGB 8542: Chemo for Met Br Ca (Companion Avail)
LONG.TITLE CALGB 8542:  Alternating Chemotherapy for Stage IV
(Recurrent) Breast Cancer (CALGB 8662 companion available)
VER.NO 1         VER.DATE 07-17-86    PI Carey, R.W.

DISEASE Breast cancer                                RANDOM N
STAGE IV

SHS 10-08-85       CONSENT.EXP 01-15-87     CONSENT.REV 01-08-86


MGH.ONLY N         1 CALGB affils            2
                   3                         4
                   5                         6
                   7                         8
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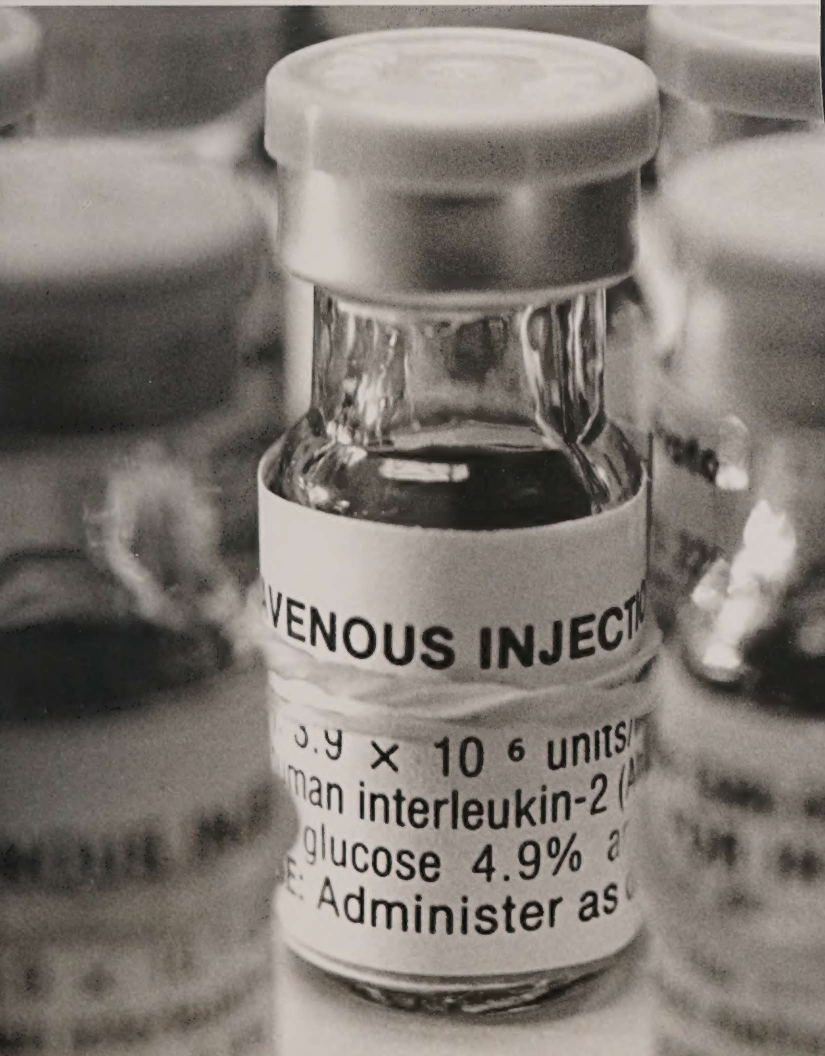
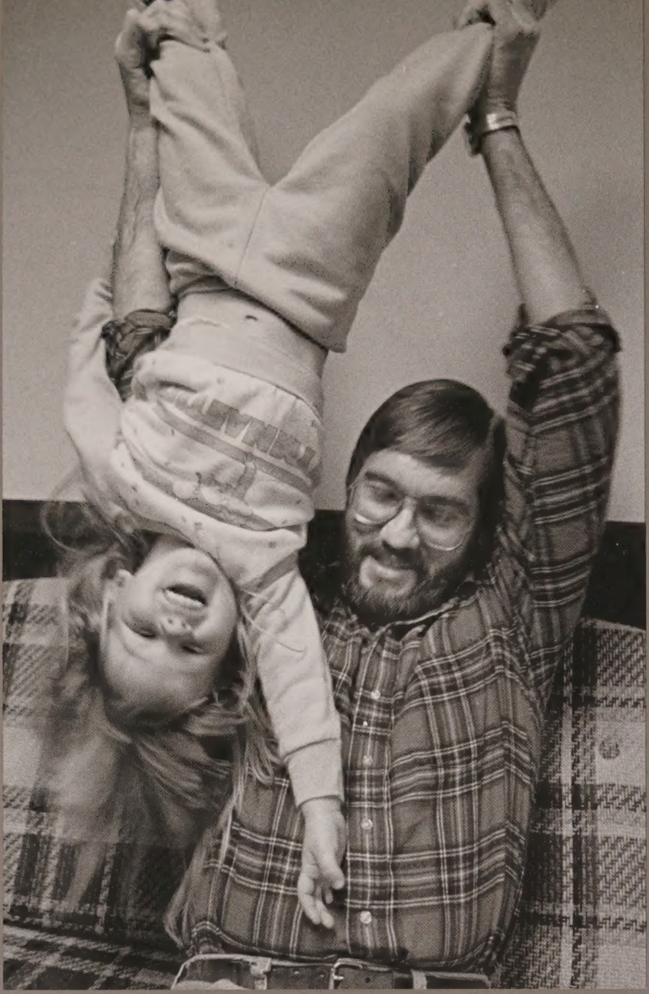




Shown playing with his 2-year-old daughter in their Manchester, N.H., home, Paul Huot, a diabetic for 20 years, can eat sweets once again after receiving a pancreas and kidney at the MGH.

SOME BUNNY LOVES ME

Adopted at birth, Alicia Sferrino, left, met her natural mother, Ruth Foisy, for the first time when the daughter needed donation of a kidney.

Mark Reutter outside the Bulfinch Building where he concluded a 700-mile bicycling and running campaign that raised funds for MGH cancer research

There are many ways of expressing remembrance. Most of them are private. But sometimes the death of a loved one—especially when death comes at an early age—seems to demand a public act of some kind, an act of recognition and acceptance, but of consecration, too. When **Kimberly Ann Reutter,** an MGH patient who died of bone cancer in 1985 at the age of 21, was in her last weeks of life, her big brother **Mark** promised her he would do everything he could to fight the disease that had claimed her. At the end of May this year, Mark opened up a one-man bicycling and running campaign that took him 700 miles from one end of Massachusetts to the other and back again with Mark stopping at towns along the way to raise funds for the cancer fight as well as distribute educational literature. Mark's tour took almost a month. It concluded at noon June 26 at the steps of the MGH Bulfinch Building where he was met by a delegation of state, local, and hospital officials as well as Bernard Cardinal Law. Mark had raised several thousands of dollars for the MGH's Hematology-Oncology Unit. He had focused public attention on the need for public support of cancer research. And he had kept his promise to Kimberly Ann.

Transplantations

Organ transplantations are among the crowning achievements of contemporary medicine. This year the MGH became the only hospital in New England and one of the few in the world to transplant successfully five different major body parts, namely the heart, the liver, the kidney, bone, and now most recently, the pancreas.

The **pancreas** produces insulin and certain digestive enzymes. Its failure is the cause of diabetes. Transplantation opportunities are limited by the fact that the healthy pancreas remains viable for only a few hours outside the donor's body (a kidney can remain viable for up to three days). The recipient of **the MGH's first transplanted pancreas** was 32-year-old David Campbell of Raymond, N.H., who thus became for all intents and purposes the first MGH patient to be cured of abnormal blood sugar levels characteristic of diabetes. Said Dr. A. Benedict Cosimi, Chief of MGH Clinical Transplant Surgery, "As soon as we connected the few blood vessels to the pancreas, Mr. Campbell's blood sugar fell to normal and has remained there ever since." The transplanted pancreas began producing insulin at once, and Mr. Campbell could celebrate by eating a piece of blueberry pie—the first time he could do such a thing since the onset of his disease 20 years before.

Kidney transplantations have become so routine as to be scarcely worthy of note, but one this year at the MGH was quite special. In January 1986, 20-year-old Alicia Sferrino was rushed to Emergency with increasing weakness, fatigue, and nausea. Evaluation indicated that she was experiencing severe kidney failure with less than 5 percent of kidney function intact.

Dr. Leslie S. T. Fang, Alicia's physician, felt that Alicia would do better if a relative donated a kidney. But Alicia was adopted at birth and had never known her natural parents. Alicia's adoptive father searched for her natural mother and found her living in

Florida under her married name, Ruth Foisy. Without thinking twice, she agreed immediately to come to Boston, meet her daughter, and donate a kidney. As Alicia observed during recuperation from successful surgery, "I'm very lucky. It isn't every day that I get a transplant and get to meet my natural mother."

Another first experience for the MGH came this year when John A. Scripter of Greenville, N.H., a 45-year-old father of nine, walked away from our Transplantation Unit with a **new heart.** For Mr. Scripter, it was the start of a new life. His first heart attack had stricken him 10 years earlier. He had already gone through two triple bypass procedures and the replacement of his mitral valve; and even so, his life was still precarious, and he could not work. Now at last since his heart attack he could go back to work—he is a tool and die foreman—with a proper heart beating in his body.

For the MGH, Mr. Scripter's **heart transplantation** marked the end of a period of institutional ambivalence toward this remarkable procedure. Four times over the years since the first successful transplant was performed in South Africa, one MGH group or another decided against offering this procedure here. The last time was early in 1980, when the Board of Trustees determined that the success rate of the procedure and its demands on staff resources could not justify its addition to MGH's surgical repertoire. The MGH stand was praised by the Department of Health and Human Services. In 1984, however, reviewing their earlier decision, the trustees found that success rates were up, costs were decreasing, and patients' hospital stays were shorter. With three other Boston hospitals, the MGH formed the Boston Center for Heart Transplantation. In February 1985, this consortium was authorized to proceed. In October, its selection committee approved Mr. Scripter's candidacy. In November, a mercifully short wait, a heart became available to the consortium, and the operation was performed. Within the week, Mr. Scripter was working out on an exercise bicycle in the MGH Transplantation Unit. "I haven't felt this good in 15 years," he said, smiling broadly.

Heart

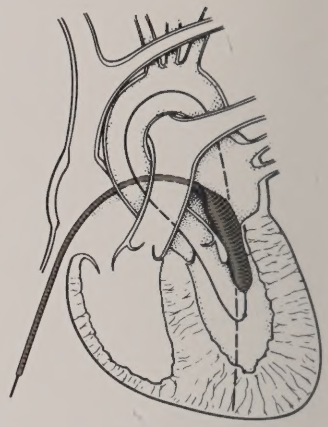
Dr. Paul Dudley White died in 1973 at 87 years of age, just six years after the world's first heart transplant, but his spirit was surely present in Oslo, in December of 1985, as a Boston-based group of physicians accepted the Nobel Peace Prize for that year. Dr. White, whose 100th birthday anniversary fell this year, founded the MGH Cardiac Unit in 1914 and was internationally acclaimed for work in his field, but he also devoted ever greater portions of his energy to the cause of **world peace.** Dr. White did not himself win the Nobel Peace Prize, although he was nominated for it in 1970; but the organization honored with the prize in 1985, the International Physicians for the Prevention of Nuclear War, was founded by colleagues of his and embodied ideas and values of which he had been an early and indefatigable champion.

In tribute to Dr. Paul Dudley White, a 38-by-52 inch photograph hanging in a corridor of the Wang Ambulatory Care Center shows the famed cardiologist examining a young patient with rheumatic heart disease.

Another kind of milestone in an area important to Dr. White was the entry of the thousandth patient in the program of the **MGH-Harvard Cardiovascular Health Center**, set up in 1979 to attack coronary disease by attacking the factors thought to cause it. Among program participants, levels of blood cholesterol — a principal risk factor for atherosclerosis — have fallen by 15 to 20 percent, levels of protective high-density lipoprotein have risen slightly, and exercise capacity has increased by 25 to 30 percent. The program shows once again that the most powerful medicine against heart attack is preventive medicine.

But when heart attack strikes, a radically new diagnostic test, 10 years in development in the MGH Cardiac Unit, now makes it possible for physicians to determine precisely how much of the heart muscle is still alive and likely to recover, and to do this within hours rather than a few days after the attack. This test is based on the use of monoclonal antibodies. These are biologically engineered antibodies designed to seek out specific targets within the body. The scientific premise of the new test is the fact that a certain heart protein, myosin, is only exposed to the bloodstream when the membrane covering the heart cell is broken, as it is in a heart attack. Conventional tests do not differentiate between irreversible and temporary damage to the heart cells, but the myosin-specific antibody can tell us soon after a heart attack precisely how much tissue has died.

Our Cardiac Unit also demonstrated this year the effectiveness of **a new balloon technique** in reversing the narrowing (stenosis) of the heart's mitral valve which accounts for as much as 40 percent of all cardiovascular disease. The new technique is called percutaneous balloon valvotomy (percutaneous meaning to pass through the skin). The MGH study followed 35 mitral-valve patients of ages ranging from 13 to 87, all of whom received PMV (percutaneous mitral valve) treatment as an alternative to open heart surgery. Blood flows from the lungs, freshly oxygenated, into the heart's left ventricle, or pumping chamber, passing through the mitral valve. In the diseased heart, scar tissue and calcium deposits restrict the movement of the valve. In PMV treatment, a needle hole is made in a vein in the patient's thigh and a collapsed balloon (or in a variation, two balloons) is threaded to the heart and across the mitral valve. Once in place the balloon is inflated reopening the leaflets of the valve. Most patients in the MGH study experienced improved blood flow and clinical signs following PMV treatment.


To reopen a heart's tight mitral valve, a balloon is fed through a major vein into the right atrium (upper chamber), then through a pierced wall into the left atrium, and is inflated within the valve.

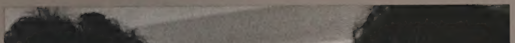
Precise diagnosis of heart disease is the foundation of effective treatment. Physicians need to know exactly where and how extensive the damage is. They need to know the speed, volume, and turbulence of the blood flow at particular places in the heart, and obviously it would be good to be able to find such things without causing patients a great deal of discomfort or putting them at risk.

Discomfort and risk, however, are the unavoidable companions of the several diagnostic methods now in use. Angiography, for example, which is nevertheless an invaluable diagnostic aid, requires the injection of a dye for use as an X-ray contrast agent. The dye can cause allergic reactions and kidney disease. The catheter which takes the dye to the heart must be threaded in, which is a serious surgical procedure in itself. Patients must be hospitalized overnight to be watched for signs of internal bleeding. This adds to the cost of the procedure.

These problems will all vanish, however, with further refinement of a new technique under development at MGH that employs the revolutionary diagnostic tool known as **magnetic resonance imaging,** or MRI. MRI is a painless, noninvasive method of examining any internal structure and watching it as it works. The technique uses a powerful tubular magnet that surrounds the patient and is open at both ends. With a magnetic field thousands of times stronger than the earth's, this magnet causes a small percentage of the body's hydrogen protons to come into uniform alignment. A brief radio pulse is then beamed at the protons, causing them to wobble as they spin, like a child's top. As the protons return to their polarized state, they give off signals which depend on the particular characteristics of the tissue of origin. A computer converts these signals into sharp, detailed images of the organ of interest.

MGH researchers emphasize that much development work must be done before MRI-based heart diagnosis can be brought on line, and they believe that the vessels of the heart, because they are never still, pose an especially difficult, but solvable problem. The technique, however, has already produced detailed images of arterial blood flow through the lower extremities. MR imaging may one day replace, or at least provide, an alternative to angiography for the diagnosis of circulatory diseases.

Magnetic Resonance Imaging provides a painless, noninvasive way of examining the body's internal structures.

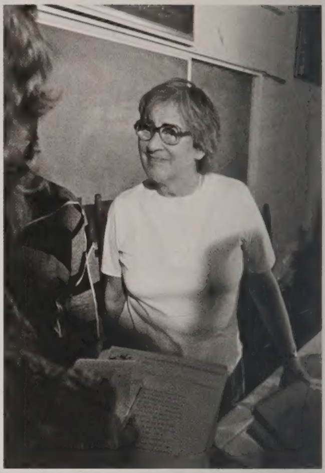


MR images can be studied even as the diagnostic test is in progress.

History stops with us sometimes in the form of particular persons whose destiny has become in some way a public one. This year among such individuals under our care was **Dr. Yelena Bonner.** As the wife of Dr. Andrei Sakharov, a former Nobel Peace Prize winner, she is with her famous husband a symbol of courage to speak out in the face of oppression.

Dr. Bonner came to the MGH with numerous circulatory problems, chiefly a recurring angina that developed in the aftermath of a severe heart attack she suffered in 1983. Poor circulation also caused leg pain on walking even a moderate distance. Angiography at the MGH showed that she still had circulation through her blocked arteries, giving hope that her condition could be alleviated with medicines, but her condition worsened despite continuing care, and in January 1986 she had coronary artery bypass surgery on three main and three branch coronary arteries. Continuing problems of circulation in her lower legs were partially relieved by angioplasty (balloon dilation) of the artery in her right leg.

Dr. Bonner succeeded in overcoming a lifelong cigarette habit while she was with us. We commend her on this not inconsiderable accomplishment and hope that she will be able to retain her resolve.



Dr. Yelena Bonner chats with a reporter after a farewell news conference at the MGH.

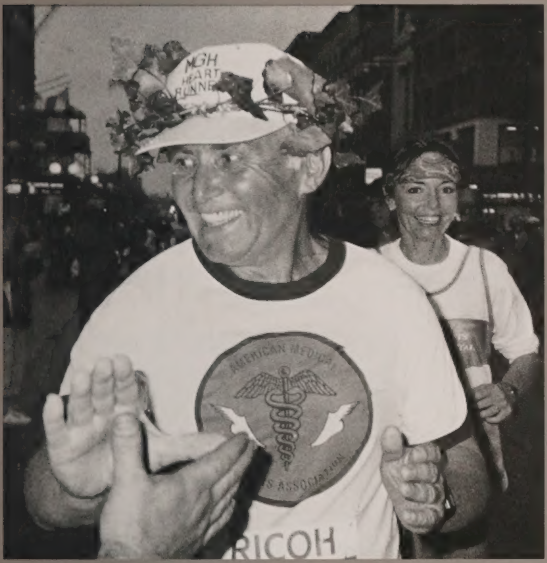
It is never too late to become realistic with oneself about the things one should and should not do to one's body. Without in the least denigrating the "miracle" cures of modern medicine, we are compelled to say that the best remedies are still preventive ones, and that preventive remedies are essentially in the hands of the individual, either to take up or to ignore.

A shining example of what a person can do to come back from the brink of cardiac disaster is that of **Nelson LeClair** of Winthrop, who suffered a cardiac arrest and went through open heart surgery in 1980. He realized on recovery that he was sadly out of shape for a man of 47 years. He weighed too much. He never exerted himself physically.

In mid-1981 Mr. LeClair joined the MGH Cardiac Rehabilitation program, meeting at the Harvard track as well as the hospital. As an added incentive in his new undertaking, he clipped and posted a 1985 news article about a heart transplant recipient who had run in the Boston Marathon. He decided that he wanted to do the same thing, and his progress in making himself fit by running 20 miles a day by December of 1985 convinced his MGH "trainers" that he could certainly give it a shot. His MGH doctors and nurse-therapists became deeply involved in getting him in shape. Nurse Kris Nelson, in fact, ran the entire 26-mile, 385-yard race right alongside Mr. LeClair, and his physician, Dr. Greg Thomas, was always close by. He finished roughly three and a half hours off the pace, but then he never set out to break a speed record.

The surprise came later that night on Channel 5's "Chronicle" when Mr. LeClair revealed that he had raised $1,700 in pledges for the MGH-Harvard Cardiovascular Health Center, saying of Nurse Nelson, "I couldn't have done it without her."

Wearing protective devices that radio heart signals to a monitor, patients participate in cardiac rehabilitation exercises at Harvard's indoor track.


MGH
HEART
RUNNER
AMERICAN MEDICAL
ASSOCIATION
RICOH

Although he had undergone open heart surgery, Nelson LeClair ran, and completed, the Boston Marathon. In the rear, lending encouragement, is Cardiac Nurse Kristine Nelson, RN.

Patients stay within a prescribed pace as they jog along the Harvard track.

Women

More comprehensive **health care for women** is the objective of a new clinical program set up this year within the MGH. The practice is called **Women's Health Associates,** and its premise is that women experience special health needs that have not always been adequately recognized and dealt with by traditional medicine. Indeed, the patients themselves are being drawn into a collaboration with professionals in an attempt to refine health care methods in a variety of applications. WHA's research emphasis is on problems associated with the years 18 through 55, comprising the reproductive years and the menopause, but it is at the same time a primary care practice which we invite our women patients to see as their focal point for total health care service.

Menopause is virtually a discovery of the 20th century. Its onset does not occur until about the age of 50, and until modern times the average female lifespan was below that, so that menopausal phenomena did not have time to appear. And since menopause affected only women, the male-dominated medical community tended to overlook the problem altogether. In the entire history of medicine, an attempt to define menopause systematically only emerged in the last two or three generations.

Even today, basic questions are still debated. The last several decades, for example, were dominated by a widespread assumption that menopause was an essentially psychological phenomenon, and that the depression that women often complained of in their middle age was a response to the empty nest and the end of their mothering years. But current clinical findings point instead to a deficiency of estrogen, the female sex hormone. When estrogen is administered, depression lifts, and sleep is improved. Similarly, the painful cramps that sometimes come with menopause were also lately regarded as psychological in origin but have been shown to be responsive to inhibitors of prostaglandins (hormone-like regulating substances).

There is much to learn. Why do women of middle age begin to lose bone density? Why are women relatively protected against heart attack until their menopausal years, when they become as vulnerable as men? What triggers the process? Why do the ovaries run out of eggs?

Among members of Women's Health Associates are, from left, Kathleen H. Ulman, Ph.D.; Janis Hersch, Business Manager; Dr. Cornelius O. Granai, Dr. Sherry Haydock, Martha M. Marean, RN; Dr. Nancy W. Rigotti, and Dr. Albert G. Mulley.

Of joints and bones

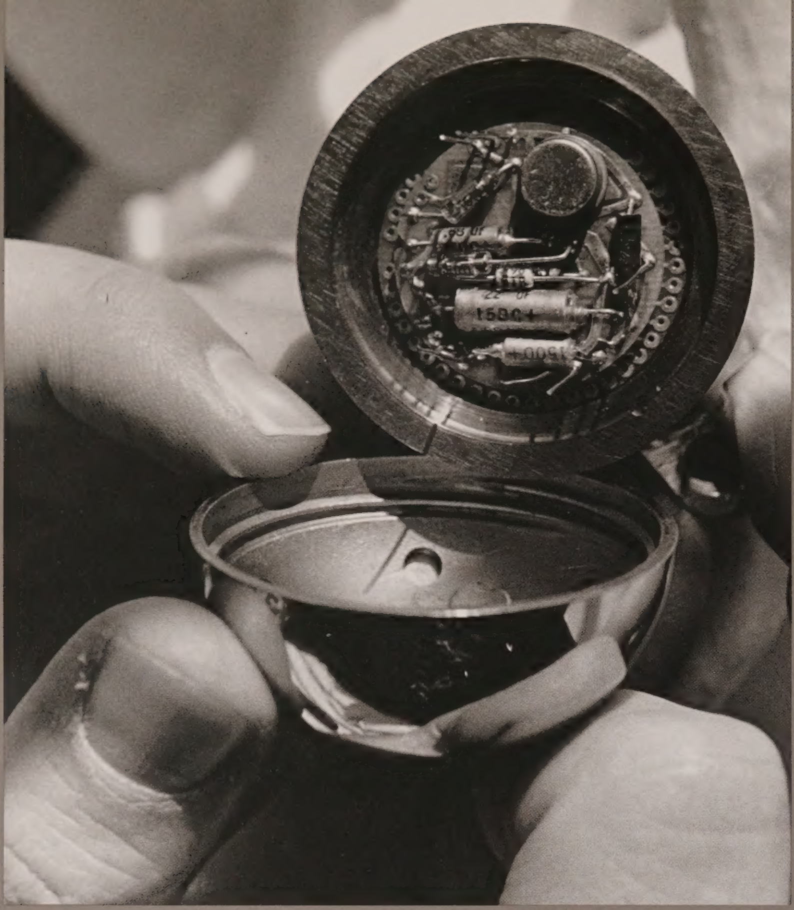
The most commonly performed surgical procedure in the United States is **total replacement of the hip.** It is performed about 100,000 times a year, and it leads in almost all cases to improved health. Complications can arise, however, and for patients over 39, their most common cause is deep vein thrombosis (DVT) (or deep vein blood clots), which can strike the lung. When the clot travels to the lung, it is called a pulmonary embolism. Two percent of total-hip-replacement patients die from a fatal pulmonary embolism, in fact, if they are not protected from DVT. The traditional means of supplying this protection is through high doses of the blood thinning drug, warfarin, but this entails a substantial risk of internal bleeding.

A way through this dilemma proposed by MGH investigators is being examined clinically by orthopedic surgeons. The hypothesis is: the best protection against DVT in patients over 39 is a 12-week course of low-dose warfarin. A study at McMaster University in Canada showed that low doses of warfarin were as effective in its *prevention*.

These findings are among the results of an extensive study spanning several years to explore this complication of hip surgery, and its diagnosis and treatment, and a safe, cost-effective response to the problem of DVT. Said Dr. Guy Paiement, MGH Clinical Fellow in Orthopaedics and principal investigator, "The public expects humane, high-quality health care at a reasonable cost. We believe the results of our study will help to meet those expectations. It has already changed the way the MGH treats its total-hip-replacement surgery patients." Now more than 100 patients have had this new form of prevention, and results are excellent.

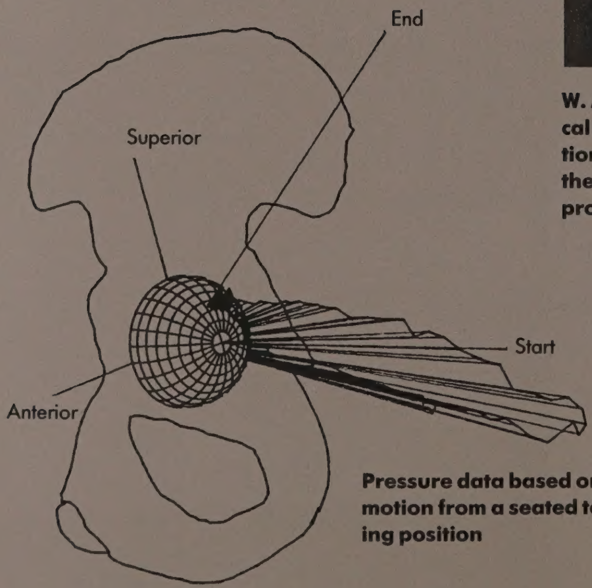
Another problem treated in part by orthopedic surgeons is **Gaucher's disease,** an inherited enzymatic disorder, first described in 1882. It attacks the liver, spleen, and bone marrow, and, at a certain level of severity, leads to osteonecrosis, a complication in which bone loses its blood supply and thus dies. To find out more about this disease, MGH investigators working with Dr. Henry J. Mankin, MGH Chief of Orthopaedics, have carried out magnetic resonance imaging (MRI) scans of more than two dozen Gaucher patients. MRI described on p. 14 is a new, noninvasive means of seeing with great detail into the body's many organs and vessels. In Gaucher patients, MRI scans are being used to search for early signs and paths of the bone disorder that often but not always accompany this enigmatic disease. If a way could be found to predict which Gaucher patients will develop osteonecrosis, then many expensive hip-replacement procedures might be obviated by early treatment.

MGH skeletal radiologist, Dr. Daniel Rosenthal, reports that MRI scanning appears indeed to surpass all other imaging techniques in detecting the presence of Gaucher's disease. "By looking at the Gaucher cells in the bone marrow, using MRI, we have found that the sequence in which anatomical sites become involved is not random. The abnormal



A close-up view of a tiny radio installed in a hip prosthesis to relay important pressure data to a receiver outside the body

W. Andrew Hodge, M.D., Clinical Director of the MGH Biomotion Laboratory, demonstrates the positioning of the hip prosthesis.



Pressure data based on body motion from a seated to standing position cells appear first in specific locations and then spread through the body in a predictable pattern. We can use the distribution of abnormal tissue to determine the stage of the disease, and to infer the risk of complication, such as osteonecrosis."

In related work at the MGH supported by the National Gaucher Foundation, Dr. Samuel H. Doppelt, both an orthopedic surgeon and endocrinologist, reports progress in understanding the physiological roots of the disease. Says Dr. Doppelt, "We've come up with some extraordinary data to suggest that these patients don't absorb vitamin D or calcium very well. We're looking at a possible way of giving vitamin D which may turn the whole disease process around as far as limits on the amount of bone they make are concerned."

To provide better care, the MGH Orthopaedic Service this year established the Harriet Klein Clinical Unit, dedicated exclusively to Gaucher's disease patients. The clinic operates an "Orthopaedic Hot Line" for Gaucher's patients through the offices of Dr. Mankin and Dr. Doppelt.

It was two and a half years ago, in 1984, that a 73-year-old Massachusetts woman, Mrs. Helen Flint, broke her hip in a front porch accident and came to the MGH for hip implant surgery.

But one coincidence made her special. Almost 20 years before, Robert W. Mann, Whitaker Professor of Biomedical Engineering at the Massachusetts Institute of Technology, and Dr. William H. Harris, Chief of the MGH Hip and Implant Unit, recognized that certain kinds of data about the mechanics of the hip could only be acquired by building a testable model.

Their work branched along many pathways in the course of two decades. One was toward the development of an artificial hip, utterly safe and not compromised in the least as a prosthesis, that would at the same time be packed with pressure sensors and a tiny radio capable of transmitting data to a receiver outside the body. It would be powered by an electromagnetic coil worn as a garter and thus could transmit complex pressure data without batteries on a long-term basis; this was important because information was needed on the aging of cartilage and the hip muscles.

Working together, MGH orthopedists and MIT biomedical engineers succeeded about three years ago in creating just such a device. Serving the same role as a normal implant and equally safe for the patient, the instrumented hip endoprosthesis carries an **incredible electronics payload** mounted within its ball (or femoral head), including 10 pressure-sensing areas on the surface with a strain gauge attached to each. As the patient walks, the hip-joint cartilage applies pressure to the ball, producing tiny deflections of the ball's surface. These deflections act on the strain gauges within it, and their response is sensed by six microelectronic boards and then transmitted by a miniature FM radio. A coil of wire shaped like a garter and worn around the thigh during data acquisition transmits external power to the prosthesis antenna, which extends along the prosthesis stem. This eliminates the need to put a power supply inside the patient. It means that data can be collected throughout the patient's lifetime with only the inconvenience of turning on an FM receiver.

This was the remarkable device that MIT and MGH created between them, and it had just come into the world when Mrs. Flint arrived at the MGH in need of a hip implant. Mrs. Flint is a plucky, vigorous person, blessed with an inquiring mind and a cooperative attitude. Her physician and surgeon, Dr. W. Andrew Hodge, Clinical Director of the MGH Biomotion Laboratory, realized that she was an ideal candidate for the instrumented hip. Says Mrs. Flint, "Dr. Hodge explained its safety and how it could provide valuable information not only for myself but for many others in similar situations. So I decided to help if I could." Scientists began collecting data from Mrs. Flint's implant in the operating room during surgery, and in the two and a half years since then, through all phases of her postoperative recuperation, the data have kept coming.

And there have been major surprises. For one thing, pressures in the hip joint turned out to be much higher than expected. Common wisdom had postulated that standing on one leg might result in a pressure of, say, 200 pounds per square inch at the top of the hip socket. But now Mrs. Flint's implant has told us that pressures in the socket approach 3,000 psi.

The instrumented hip has also revealed that the greatest pressures appear at the back of the socket rather than on top of it, that these high pressures arise in the simple act of getting up from a chair, when they are more than double those of jogging, that a single cane is almost as good as two crutches in reducing peak pressures in the joint. Indeed, the discoveries attributable to the Flint implant are continuing to unfold. Insights gained from this unique experiment began immediately to help surgeons create better fits and therapists to establish sounder courses of recovery.

There is still much to learn. As Dr. Hodge points out, "It may be that a physically active 55-year-old male may show even higher pressures on the cartilage than Mrs. Flint does, just because the muscle function and body build are different." Thus, the MGH/MIT research team hopes to implant five or six more instrumented prostheses in patients of differing ages, body sizes, and levels of activity.

Of depression, narcotics, and pain

MGH research teams this year inaugurated several new studies directed toward the medical treatment of depression and recently reported on two long-term research inquiries, one into drug abuse and personality traits, the other on the vexing question of patients who are healthier than they will let themselves believe.

–The drug **lithium** has been used successfully for several years in the treatment of acute episodes of **manic depression,** a severe psychiatric disorder that in almost every instance requires vigorous treatment with mood-altering medication. Past studies of lithium treatment have observed a 50 percent reduction of both manic and depressive episodes and a lessening of the severity of subsequent attacks. But sustained use of lithium at the relatively high doses involved in the treatment of an acute phase can have some side effects, such as tremor, weight gain, nausea, diarrhea, excessive thirst, and increased urination. The aim of the current MGH study is to determine if lowered daily doses of lithium can reduce or eliminate adverse side effects without lessening the patient's protection against relapse. This investigation is part of an ongoing MGH study now in its fourth year. It is sponsored by the National Institute of Mental Health.

– Another call for volunteers went out for a study to evaluate the effectiveness of fluoxetine, **a new antidepressant** which in prior studies has shown to be effective and at the same time free from many of the unwanted side effects of other medications. The drug also appears to be safer than some of the alternatives, partly because it results in weight loss rather than gain. This makes it potentially the preferred choice for the treatment of older patients in particular.

– As these and other studies were getting under way, older ones were bearing fruit. One example is our 12-year-long investigation of **substance use among young people.** The personality traits of adolescents were tested as indicators of their future likelihood as young adults to use cigarettes, alcohol, and drugs. Researchers caution that factors completely separate from the personality (such as role models, peer groups, and drug availability) also help determine individual behavior in this regard. But within that stricture, the MGH study found that early values and attitudes were important predictors of later behavior. The study began in 1969 with 900 adolescents and proceeded to follow them into young adulthood, testing them at intervals along the way. In the words of chief investigator Gene M. Smith, Ph.D., an MGH psychologist, "Personality is a significant piece of the puzzle as to what leads to substance use. Certain values, attitudes, and orientations toward life tend to be found in children who have a high likelihood of becoming users." The study's most general finding was that an adolescent with a low degree of socialization and a high degree of extraversion was most at risk of becoming a user. Such children need understanding support from parents and teachers and, perhaps especially, from role models such as star athletes and musicians.

– Personal attitude, or the stance one takes toward life as a whole, turned out also to be an important factor with patients who chronically report **phantom discomfort,** or more pain than can be explained clinically. Between 25 and 40 percent of the patients who present themselves at doctors' offices are healthier than they thought, but a significant number of these patients continue to insist that they are unwell. Psychiatry is convinced that the beliefs are genuine, the discomforts really felt; it may be, however, that the discomfort arises from the conviction rather than the reverse. Dr. Arthur J. Barsky, who directs the Primary Care Psychiatry Unit in the MGH's Wang Ambulatory Care Center, has discovered a remarkable range in people's reactions to bodily sensations. Those who continually feel sicker than they appear to be are often inclined to pay excessive attention to the internal patter of the little twinges, pangs, and transient spasms that are the lot of us all, building them into dire threats to health. The unit provides counseling for such patients, trying to help them see, in Dr. Barsky's words, "The people who do best are those who learn to live with what they have."

Kidney stones that lodge in a ureter, the narrow tubular passageway that drains a kidney to the bladder, often have to be surgically removed or removed with large instruments that can cause serious injury. It is not a pleasant or inexpensive procedure.

But new methods of treatment promise a radical easing of patient discomfort as well as sharp reduction in length of hospitalization and costs. The most recent development is aimed at attacking hard-to-reach stones, particularly stones that become lodged within the lower half of the ureter because of their position deep behind the bones of the pelvis. An estimated 100,000 Americans a year face this condition.

To respond to this problem scientists in the MGH Wellman Research Laboratories of Photomedicine, which are directed by Dr. John A. Parrish, a few years ago began development and then clinical testing of a nonsurgical approach to the elimination of ureter stones—this one involving the laser.

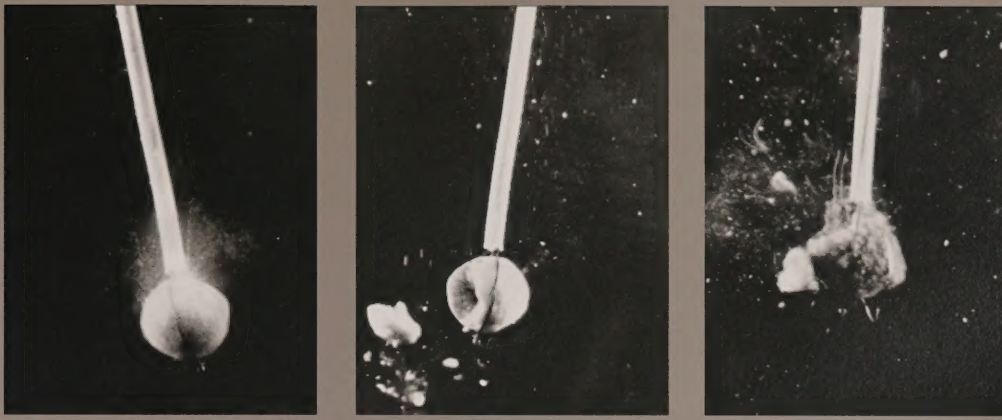
Because of the precision with which its energy can be directed, a laser can destroy very tiny stones with no damage to surrounding tissue.

Dr. Stephen P. Dretler, MGH urologist, worked with a team of laser experts headed by Dr. Parrish, a pioneer in the use of light as a therapeutic tool. In the new procedure developed by this group, a narrow ureteroscope is inserted into the ureter through the bladder. Threaded through this scope is a tiny optical fiber, its diameter about one third that of pencil lead, that carries the light of the laser to the stone. Short bursts of laser light are then fired against the stone, fragmenting or pulverizing it so that it can be removed in a tiny basket or simply passed by the body. The laser fires at a rate of five pulses per second; about 2,000 pulses are required to fragment a typical half-inch stone. The fragmentation itself usually takes only a few minutes.

At the time of a scientific report in May 1986, 34 patients had been treated by this method at the MGH. All treatments were successful except for one patient who ultimately required surgery. Since that time a total of 55 additional patients have been treated with comparable success. Of those Americans who must undergo treatment for ureteral stones, MGH investigators believe that 70 percent are candidates for pulsed-laser treatment. In fact, Dr. Dretler believes that the laser treatment "will be the treatment of choice for large stones in the middle and lower ureter." Moreover, he points out, "This laser procedure for stones opens the door for microinstrumentation in the urinary tract and may lead to therapeutic uses in other parts of the body."

Dr. Parrish shares the excitement about the development of laser-based procedures and believes that the laser will come into its own throughout medicine as a safer, simpler, less expensive, less invasive alternative to some forms of conventional surgery. "In the future," he says, "lasers will move a portion of patient care from operating suites to outpatient facilities and shorten hospital stays from weeks to hours, possibly to minutes."

The struggle to conquer the AIDS virus continues across a broad front. Sometimes progress is grim, as in the discovery this year in an MGH program that HIV, the virus responsible for AIDS, can be present in vaginal secretions and is thus theoretically transmissible by females to males.



A pulsed dye laser fragments a ureteral stone in this series of photos. Picture at left shows initial impact. In center, the stone after a few pulses. At right, the stone after several more pulses.

The laser beam used to fragment kidney stones in a ureter is only a third the width of lead in a pencil.

Another MGH study found that the AIDS virus is capable of penetrating the blood-brain barrier and causing such disease of the nervous system as dementia, meningitis, and spinal cord degeneration. This means that any effective antiviral treatment must also penetrate the blood-brain barrier.

These are distressing findings, confirming all over again HIV's reputation as one of the most demanding challenges to be faced by modern medicine. Yet such findings are the essential stepping-stones toward successful treatment and ultimate eradication. The first steps toward effective treatment were taken in studies conducted at the MGH and eleven other medical centers, where azidothymidine (AZT) was convincingly shown to prolong the life of certain patients with AIDS.

The Upjohn Company of Michigan has awarded an unrestricted grant of $1 million for the support of the MGH research programs. The hospital Committee on Research has used this Upjohn fund to establish the Upjohn Scholar Award which will support the research of junior MGH staff members. Four awards of $50,000 a year for three years have been given to Drs. Stephen B. Calderwood of the MGH Infectious Disease Unit, William E. Russell of the Pediatric Endocrinology Unit, Stephen J. Hauser of the Neuroimmunology Unit, and Kathleen J. Sweadner of the Neurosurgery Research Unit for whatever research path they choose. Some of the fund has also been used to support a Small Grants Award program for pilot projects and research equipment.

This grant was made available in conjunction with a joint project between the hospital and Upjohn to explore the dynamics of the interaction between academia and industry in the support of research.

The Burroughs Ring. Mr. Robert H. Burroughs describes himself as "about 95 percent handicapped, unable to dress, feed, or do much of anything" for himself. He has cerebral palsy and is confined to a motorized wheelchair.

But he has an unbeatable will to experience life, as we at MGH well know since he has been a member of the MGH family for the past 14 years. He works in the MGH Transport Department delivering information and materials to different parts of the hospital and volunteers his services in helping to educate the staff and medical students on the special needs, problems, and interests of the handicapped. He lectures on the same topic to groups outside the hospital and counsels patients with severe physical handicaps.

Four years ago, Mr. Burroughs posed a big question to MGH biomedical engineers: Physically handicapped individuals often cannot sign documents in the conventional way and must rely on others to help them sign such everyday papers as checks, charge slips, and legal documents. Could the engineers not create some convenient, easily used mechanism to deal with this problem? Along with his father, Mr. Burroughs had explored various devices before coming to the specialists.

Said Ronald S. Newbower, Ph.D., Director of the MGH Department of Biomedical Engineering, "Had it merely been a matter of getting a signature on the page, there were dozens of ways to accomplish that. What we didn't appreciate, and what only Bob could understand, was the psychological need for complete control of his signature."

Together, they developed a kind of signet ring that harkens back to a day when kingly pronouncements were certified in sealing wax. Passing easily as an attractive piece of jewelry, the ring can be pressed against indelible paper to transfer the ring's unique design onto a document creating an accepted signature.

While the MGH Biomedical Engineering Machine Shop went to work on the prototype, Mr. Burroughs undertook the task of convincing his bank, credit card companies, and stock broker to accept the ring's impression as his legal signature.

Mr. Burroughs and the MGH were recently granted a patent for the invention and are now seeking a company willing to invest the time and money needed to put it on the market.

Ernest G. Cravalho, Ph.D., appointed Chief of the MGH Department of Biomedical Engineering

Biomedical-engineering breakthroughs of the kind involved in the Flint implant (p. 21) are developing across a broad front of engineering techniques and medical applications. The importance of the field to MGH was underscored this year in the endowment of a new chair at the Harvard-MIT Division of Health Sciences and Technology — **the Edward Hood Taplin Professorship of Medical Engineering,** located at the MGH. This newly endowed professorship, shared by MIT and Harvard Medical School, establishes the first full academic link between the MGH and MIT.

This link was confirmed immediately by the appointment of Ernest G. Cravalho, Ph.D., a senior MIT faculty member, to the Taplin Chair, and also as Chief of the MGH Department of Biomedical Engineering, which numbers about 45 specialists. In this dual position, Dr. Cravalho and his colleagues from Harvard, MIT, and the MGH will develop new research and teaching ventures involving the synthesis of the engineering and biomedical sciences.

William E. Walch, who in August became Vice President for Resource Development and Public Affairs at the MGH

We were pleased to announce this year the appointment of **William E. Walch** as Vice President for Resource Development and Public Affairs. Mr. Walch, who comes to us from a background of communications and development, served as Associate Vice-President of the University of Chicago Medical Center. Prior to that he spent eight years on the staff of the Robert Wood Johnson Foundation in Princeton, N.J., as Communications Officer and Assistant Vice President.

From a wealth of experience, he will give a more unified focus to the areas of his purview among the MGH and its affiliates. Between 1970 and 1974 he worked in development and public relations at Johns Hopkins Medical Institutions in Baltimore. He has a B.S. in Science Journalism from Iowa State University.

The General Hospital Corporation
Excerpts from audited financial statements (in thousands of dollars)

Income	**1986***	**1985**
From patient care	$368,425	$330,744
Less free care and contractual allowances	88,543	60,080
	279,882	270,664
Research and other specific purposes	92,116	78,261
Other	17,294	14,417
Total Operating Revenue	389,292	363,342

Expenditures		
For operating expenses: Salaries and related compensation	$194,701	$185,977
Supplies, expenses, depreciation	115,198	110,814
	309,899	296,791
Research and other specific expenses	76,345	64,163
	386,244	360,954
Surplus (Loss) from operations	3,048	2,388
Endowment and other income	660	956
Surplus (Loss)	3,708	3,344

*Year ending September 30, 1986

The Hospital's Dollar	
Diagnostic and Therapeutic Services: *Diagnostic services, therapeutic services, house staff and professional staff, drugs, supplies, etc.*	50.6%
Nursing Care	15.9%
Plant and Equipment: *Depreciation, interest, energy, telephone, maintenance*	11.7%
Room and Board Services: Food, laundry, security, housekeeping	7.5%
Administrative Services: *Computer, accounting, administrative salaries, etc.*	14.3%

Massachusetts General Hospital
Facts and Figures

October 1, 1985– September 30, 1986	
Beds	1,081
Number of Admissions	34,129
Number of Ambulatory Visits	493,979
Inpatient Surgery	18,067
Emergency Ward Visits	71,029
Day Surgery	8,347
Active Staff	1,548
Clinical Fellows	317
Residents	416
Research Fellows	257
RNs	1,100
LPNs	85
Nursing Assistants	55
Volunteers	850
Employees	8,000 +

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Not long after its founding in 1811, the Massachusetts General Hospital launched a public campaign to raise funds for its first building. Citizens from all walks of life made contributions, ranging from 25 cents to $15,000.

One hundred seventy-five years later, the MGH continues to rely heavily on voluntary contributions to insure the hospital's leadership in patient care, medical training, and research. Again the greatest need is for buildings; the oldest inpatient buildings must be replaced with modern, efficient facilities in order to maintain the highest standard of patient care. Our current Capital Campaign reached $107,919,745 in FY 1986 toward the goal of $169 million by September 30, 1989.

Today there are many ways of giving made possible by federal laws enacted to encourage charitable contributions.

The simplest way for you to support the hospital is a gift of cash, which earns a charitable income tax deduction. Gifts of appreciated securities offer two advantages. In addition to a tax deduction of their full fair market value, they avoid taxation on the appreciated portion, now at ordinary income rates. Other assets that may be used to make an outright gift include real estate, personal property, life insurance, and business interests. Many business firms have matching gift programs that double or even triple the value of a gift to the MGH.

If you want to make a substantial contribution to the MGH but need to retain your sources of income for yourself or other family members, you may want to consider a life income gift. The principal of such a gift is held and a portion of the income earned is paid to you or another beneficiary for life. The principal of the gift comes to the MGH only after the last beneficiary dies. When you make the gift, you receive a tax deduction based on the estimated future value of the gift to the hospital. The most popular means of making such a gift is the pooled income fund, much like a mutual fund, in which the donor's gift is pooled with the gifts of others for investment purposes. The donor or other beneficiary receives a proportionate share of the income. Other life income plans can be individually tailored to your needs.

Bequests have been the largest source of funds for building the MGH over the years. A gift to the MGH in your will allows you to reduce the amount of taxes your estate might have to pay. Your bequest can be a specific dollar amount or all or part of the residue of your estate. Any of the arrangements that can be established during your lifetime can also be established by will, but without the advantage of a current income tax deduction.

For more information about giving to the MGH or about bequests or the tax-saving and income-producing advantages of planned giving, please call or write the Resources and Development Office:
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Massachusetts
General
Hospital

Annual Report
1987

Old Building No. 149 in Boston's Charlestown Navy Yard once served ships in time of war. Today, MGH is mobilizing that site for a new struggle—the war on cancer.

3 Cancer Center:
A Major Commitment

8 Heart Care

10 Transplantation

12 People and Medicine

16 Patients

18 New Programs

20 Research and Technology

24 Chairman's Report

26 General Director's Report

28 Finance, Facts, Figures

32 Ways of Giving

149

This is old Building 149 of the Charlestown Navy Yard on Boston's near north shore.

Cancer Center: A Major Commitment

The Yard has a fighting tradition behind it. Ships from all the nation's wars have come here for repair and refurbishing. Our country's first warship, the *U.S.S. Constitution*, is berthed here.

We were mindful of this fighting spirit this year as we leased and occupied 211,481 square feet of this superb old building and prepared to mobilize some of it for war again—this time, for the war on cancer.

The cancer war is a different kind of war, to be sure, but the stakes are high. In fact, we believe that Building 149 still has its most important campaigns before it.

We plan to turn almost the entirety of this new area (imagine three football fields together) into laboratory research space, more than doubling the size of the overall MGH research plant.

The MGH Cancer Center in particular is mandated to develop some 56,000 square feet of this new facility as a cancer research laboratory, augmenting the lab space already dedicated to cancer research in the Cox Building and other sites within the MGH.

Our aim is to see the new MGH laboratory soon recognized among the premier cancer research centers of the world.

Development of the new lab facilities is the focal point of a major new MGH commitment to the research war on cancer.

To carry this commitment out, we appointed as our expanded Cancer Center's new director an internationally distinguished physician scientist, Dr. Kurt Isselbacher.

Dr. Isselbacher was Chief of the MGH Gastrointestinal Unit for 30 years before being named last year as Director of the MGH Cancer Center. Dr. William C. Wood will continue as the Center's Clinical Director.

Dr. Isselbacher knows that the new position will be demanding, but he also foresees an increasingly fertile period for cancer research, mainly owing to the convergence of discoveries in cell biology, molecular biology, and genetics.

"The opportunities for advances in cancer research," said Dr. Isselbacher, "are in my view greater now than they've ever been."

The sense of impending discovery is especially keen within the science of immunology, where Dr. Isselbacher's primary research interests lie. Dr. Isselbacher is one of a small but growing number of research physicians convinced that the body's natural immune system can be helped to overcome its fatal inability to recognize the malignant cell as an object to be killed and removed. Science has recently come to understand in great detail how cancers disguise themselves from the immune system. This understanding should make it possible ultimately to help the immune system in overcoming the cancer's disguise, recognizing the threat and going on the attack with cytotoxic T cells, natural killer (NK) cells, macrophages, and other immune-system cells capable of destroying malignancies.

This research is possible because of breakthroughs achieved over 10 years ago in the science of monoclonal antibodies.

Antibodies are the body's bullets against disease. They are formed naturally when the body's "immune surveillance system" detects certain proteins known as antigens on the surface of foreign bodies.

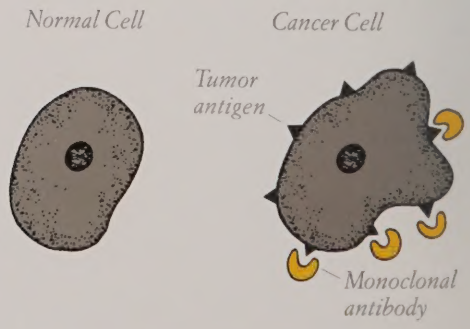
In the natural state, these antibodies are "polyclonal," meaning in effect that they cannot target a specific antigen but only a larger class of antigens. This reduces their effect.

The great discovery of 1975 was a means of producing in the laboratory, through the techniques of genetic engineering, an antibody that was absolutely specific to any particular cancer antigen: a *monoclonal antibody*. If conventional polyclonal antibodies are bullets that must be fired like a shotgun blast at a crowd in hopes that the right target will somehow be hit, then monoclonal antibodies are bullets that home on the right target to the exclusion of all others.

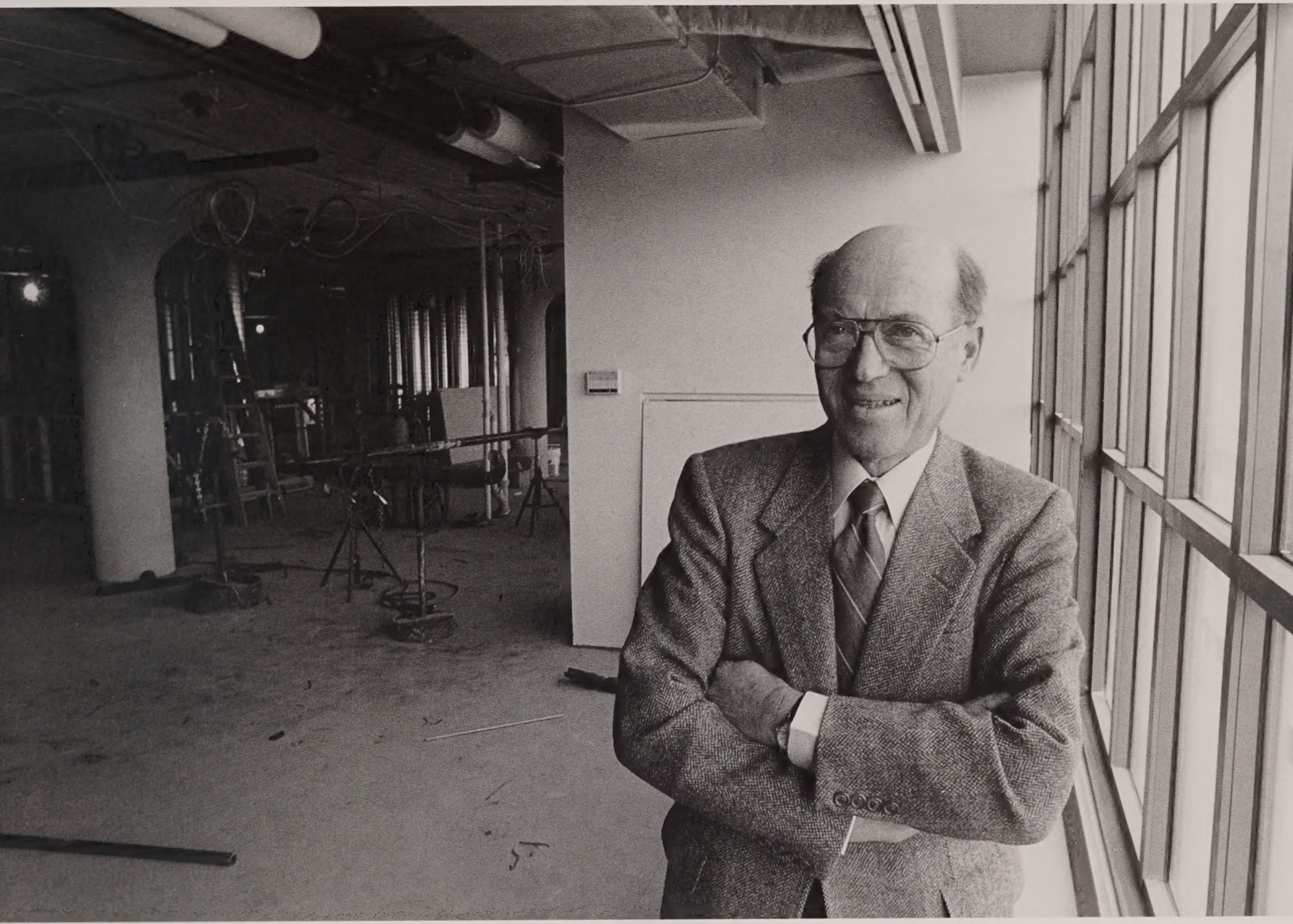
Development of this technique, as Dr. Isselbacher points out, will allow us to do two basic things that cannot be done with the surgical, radiological, or chemical means currently available in the diagnosis and treatment of cancer.

First, by chemically attaching a radioactive tag to the correct monoclonal antibody, we can in effect send a beacon light to every malignancy in the body. "This allows us to find, and thus to treat, even the most microscopic growth," says Dr. Isselbacher.

Second, by attaching a drug or other chemical medication to a monoclonal antibody, we can deliver it directly to the tumor with minimal or no danger to adjacent healthy tissue. This will allow us to use much more potent levels of cancer-toxic medications than are more currently feasible.



Monoclonal antibodies can identify and seek out cell surface changes (antigens) associated or occurring with malignancy.



Dr. Kurt J. Isselbacher at Building 149 quarters which are being remodeled to house new laboratories expanding research in the war against cancer

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"This is *now*," says Dr. Isselbacher. "We're just going from animal studies to studies in patients. We have a lot to learn about this technique. By what route should we deliver the monoclonal antibodies? How much? How often? What side effects will develop? It will almost certainly present its own clinical problems.

"And yet this is potentially a whole new modality of cancer treatment that was not available before. If we do it right, we can translate these rapid advances in molecular biology and genetics into powerful new weapons against cancer."

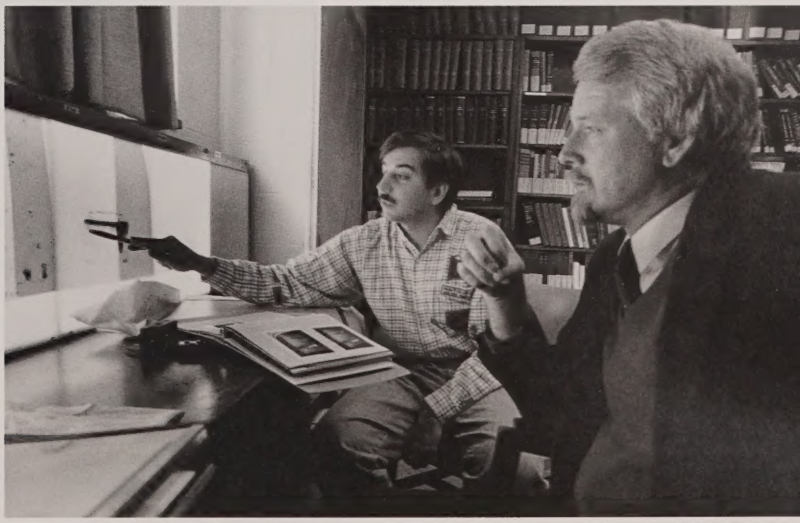
The new laboratory space available to the MGH Cancer Center will allow for a 30 percent buildup in cancer-research positions at the MGH, including several at the senior level.

Dr. Isselbacher believes the positions can all be staffed with excellent scientists. "We had many top-flight applicants for the new positions even before we advertised for them," he says, pointing out that nearby Harvard and MIT make the Boston area a major world center in molecular biology, thus a desirable workplace for those doing the most interesting research in this and related fields.

"Our task," says Dr. Isselbacher, "will be to find individuals who are knowledgeable in research but are also involved with the patient. Those are the real bridgebuilders."

Dr. Kurt Isselbacher has been Mallinckrodt Professor of Medicine at Harvard for 16 years. His numerous professional awards include the highest honor of the American Gastrointestinal Association, the Friedenwald Medal, as well as the Bengt-Ihre Award of the Swedish Medical Society. He has presided over most of the several professional organizations of which he is a member. In 1973, he was the first gastroenterologist to be elected to membership in the National Academy of Sciences, in which he currently holds several prominent positions. These include a seat on the Executive Committee and Council of the National Academy and on the Governing Board of the National Research Council and chairmanship of a committee concerned with the role of diet and nutrition in the cause and treatment of cancer. He has authored more than 350 scientific articles and edited a textbook which is considered to be the most widely used and most authoritative text in medicine in this country and abroad.

Dr. Isselbacher's many contributions to the scientific understanding of cancer date from 1971, when he demonstrated the tumor's ability to rob healthy cells of nutrients. His more recent studies concern the role of the immune system in killing and removing cancer cells.



Studying traces left by radioactively tagged monoclonal antibodies

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1987 BOSTON MARATHON
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Heart Care

Marathoners

Five patients under care of the MGH-Harvard Cardiovascular Health Center ran all 26 miles plus of the famous Boston Marathon last year, despite the fact that four of them are victims of heart attack, and the fifth is at risk. Two of the four had suffered cardiac arrests.

Ranging in age from 45 to 65, four of these athletes are shown here with their nurses, Kris Nelson (third from left) and Christie Kuo (second from right), who ran the entire course with them. The winners, starting at the left, are Nelson LeClair, Hyman Sheinfeld, Tony Theodore, and Chuck Coppola. The fifth finisher, not shown, is Frank Scala. Marathon distance runs is not a standard Health Center goal for its patients. The accomplishment of this select few demonstrates anew, nonetheless, that the onset of heart disease need not, and indeed *should* not, mean the end of active life.

Healthy heart

"Charlestown Healthy Heart Week," held in April, was an MGH outreach program motivated by the discovery that Charlestown's rate of death by heart disease was the highest in the City of Boston—astonishingly higher than the city's average. The purpose of the "Healthy Heart Week," carried out by the staff of the MGH Bunker Hill Health Center, was to educate Charlestown residents about their heart risks and how to improve their chances against heart disease. Through this program, more than 500 community people had their blood pressure and cholesterol levels checked and learned a few good things to know about their bodies.

Heart attack

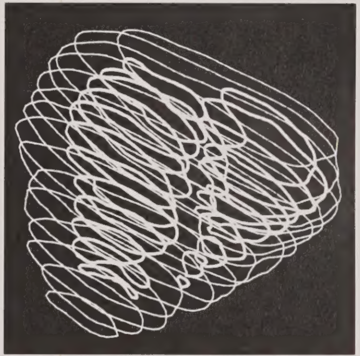
One and a half million Americans have heart attacks every year, and over a half million die, making heart attack the leading cause of death in the United States.

A primary front in the war on heart disease is the search for a drug capable of breaking up clots in the coronary arteries without causing bleeding in other parts of the body. MGH investigators last fall reported the results of several laboratory studies of promising new approaches to this problem.

They employed a combination of very specifically targeted monoclonal antibody and clot-dissolving proteins—urokinase and tissue plasminogen activator (tPA)—to zero in on the clotting component of the blood clot (fibrin) without affecting fibrinogen, an important clotting material.

The scientists then used the technology of genetic engineering to create, for the first time, a recombinant version of the antibody tPA complex. The recombinant complex can be designed to contain only essential components and can be identically reproduced in abundant supply. The result is a more potent, yet safer, dose of clot-dissolver to its precise target.

"These are exciting early results," says Dr. Edgar Haber, Chief of the MGH Cardiac Unit, in whose laboratory the work was done. He stressed, however, that it may be several years before these complexes will be attempted on people having heart attacks.



Computer generated three-dimensional models used in mapping heart regions.

Arrhythmias

Arrhythmias are malfunctions of the heart's electrical pacing system, and they claim a half million lives annually in the United States.

One type of arrhythmia, called supraventricular tachycardia, involves periodic racing of the heart. Conventionally, it has only been treatable through open-heart surgery or medications of sometimes dubious benefit and potentially serious side effects.

But now through a new technique pioneered in the MGH laboratory of Dr. Jeremy M. Ruskin and a few other hospitals in the world, some drug-resistant supraventricular tachycardias can be treated much more directly and definitively. This new technique is based on the fact that most supraventricular arrhythmias involve a region of the heart called "the bundle of His." The region of the bundle of His can be neutralized precisely by a low-energy electrical shock that results in reducing the heart to about 50 beats per minute, a comfortable pace.

No physical or dietary restrictions are entailed by this technique, although a backup pacemaker is required in most patients.

Transplantation

Transplantation rejection

The body's natural tendency to reject donated tissue remains the great problem in the science of organ transplantation. To keep the patient's immune system from attacking and destroying the transplanted organ, it is possible to medically weaken the immune system as a whole. But this exposes the patient to powerful infections.

"Rejection is still the leading problem in transplantion," says Dr. Paul S. Russell, Chief of the MGH Transplantation Unit and John Homans Professor of Surgery at Harvard Medical School. "We have enhanced our ability to control rejection, but we believe we can do even better. We must gain a better understanding of the immune system, specifically how to affect the immune response to the transplant without suppressing the disease-fighting abilities of the rest of the body."

To continue its research into the rejection problem of heart transplantation, the MGH was awarded a $4.6 million grant from the National Heart, Lung and Blood Institute. The MGH has maintained federally supported programs in the study of transplantation rejection continuously for the past 25 years. The new five-year grant will also support research in several related areas of this field.

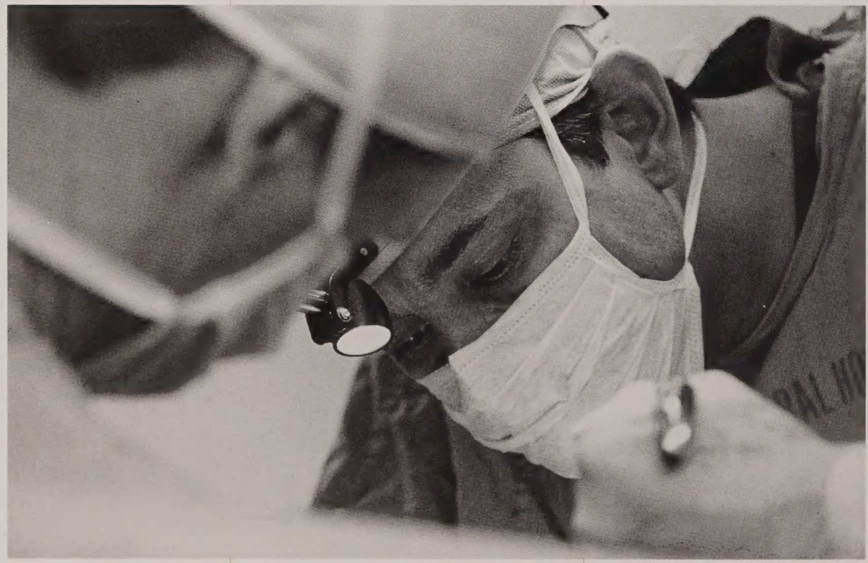
The MGH is one of the few hospitals in the world capable of transplanting five different organs in both adults and children, namely, the heart, the liver, the kidneys, the pancreas, and bone.

Pancreas-kidney transplantation

We reported last year our first successful double transplantation of a kidney and a pancreas. David Campbell of New Hampshire, 32 at the time of his operation, had been diabetic since the age of 12, requiring insulin injections twice a day. As soon as his blood vessels were connected to his new pancreas, his blood sugar fell to normal. Subsequently we could announce that he was the first MGH patient to be cured of hyperglycemia of diabetes.

The MGH surgical team directed by Dr. A. Benedict Cosimi, Chief of Clinical Transplantation Surgery, and Dr. Paul S. Russell, Chief of the Transplantation Unit, was so encouraged by Mr. Campbell's response that it has performed the procedure on 15 more diabetic patients, ranging in age from 26 to 44, most of whom were suffering from advanced degradation of peripheral blood vessels and all of whom had end-stage kidney disease. Two had lost a limb before the pancreas-kidney transplantation, and one needed an amputation shortly thereafter. Two patients have died of infection after their operation.

The remaining 14, however, have been doing well since their double transplants, resulting in a surprisingly high percentage of success. For the first time since the onset of their disease, their bodies are producing a normal flow of insulin, and they can eat without fear of sweets. Without the double transplants all 16 would have needed continued kidney dialysis and insulin to stay alive just a few more years.



Pancreas-kidney transplant recipient Dana F. Edwards works out with weights.

40

People and Medicine

Health care for the homeless

Two graduate students in the MGH Institute of Health Professions, Ellen Fagan and Jamie O'Connor, both licensed RNs, helped set up and operate this year a health clinic for the city's homeless in Boston's South End. The clinic is part of the Cardinal Medeiros Center, a daytime shelter for the homeless situated in the basement of the Holy Trinity Church and operated by the Kit Clark Senior Center of Dorchester. The MGH encourages its staff to seek this kind of close involvement in a community's particular health-care problems.

MGH INSTITUTE OF HEALTH PROFESSIONS

The MGH Institute of Health Professions is a fully accredited graduate school. The institute offers Master of Science degree programs in Dietetics, Nursing, and Physical Therapy. It also maintains a Neurolinguistics Laboratory for the study of speech and language disorders and recently inaugurated a program in medical ethics.

Class of '87

Thirty-three graduate school students in dietetics, nursing, physical therapy, and social work received degrees, diplomas, or certificates this summer at the seventh graduation ceremony of the MGH Institute of Health Professions.

The Institute embodies our recognition of the enormous technical knowledge that must be under command in all phases of contemporary health care.

Dr. Earle W. Wilkins—Emergency Ward

Naturally it is mere coincidence that our Emergency Ward shares its initials with the man who has been Chief of MGH Emergency Services since 1969, Dr. Earle Wilkins. Yet it is fitting to choose Dr. Wilkins' retirement this year as the moment to retire as well the name, "Emergency Ward," and thus rename this vital and central MGH service.

A graduate of Harvard Medical School, Dr. Wilkins interned at the MGH in 1944 and joined our staff a year later. He is also a recent past president of the New England Life Flight Board, which operates a critical-care helicopter service known as Boston Med Flight.

EMERGENCY
WARD

Senior action

MGH General Director J. Robert Buchanan is shown here as he signed an agreement last year with the Massachusetts Senior Action Council, a citizen advocacy group. The MSAC had petitioned the MGH for certain changes in the health-care process involving interpreter services and printed discharge information. Said Dr. Buchanan, "We are pleased that we found a mutually acceptable way to better those two programs."

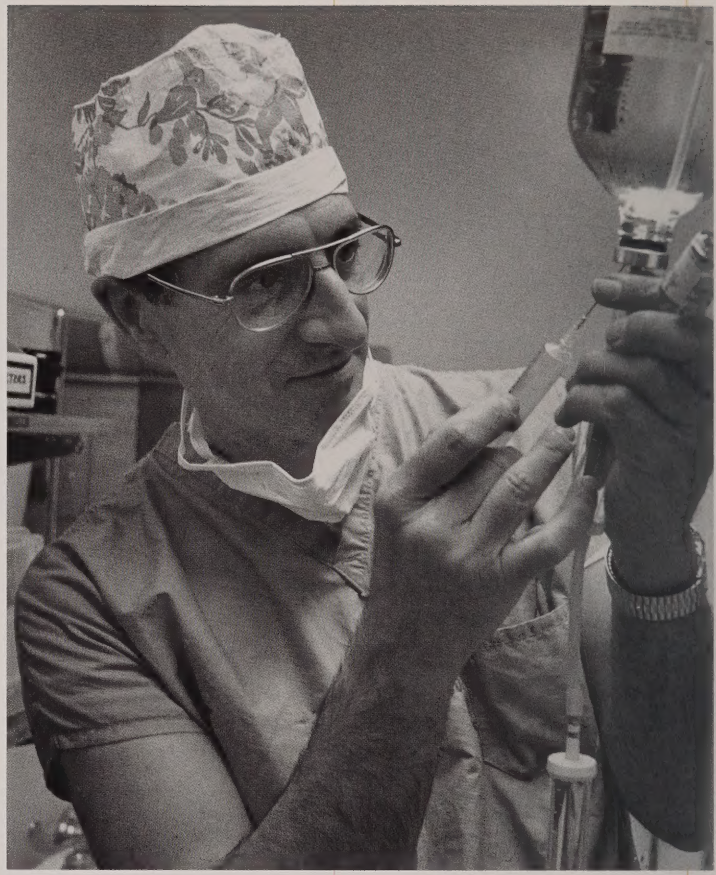
People and Medicine

A new research office created

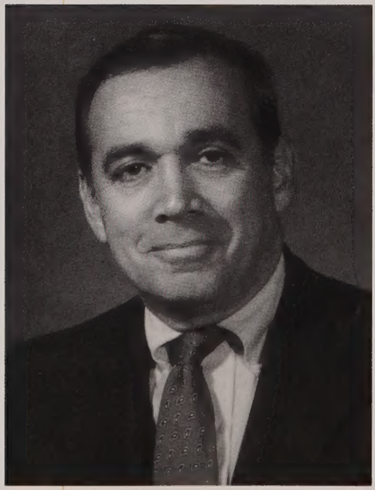
Since its founding in 1811, the MGH has been among the foremost medical research institutions in the United States. Currently more than a thousand of our staff members are engaged in research projects that span the breadth of contemporary medical science. Sponsors from the federal government, industry, and foundations sustain an overall research budget running nearly $79 million annually.

To help track this increasingly large and complex research effort, the MGH established this year the Office of Research and Technology Affairs under Dr. Ronald W. Lamont-Havers, an MGH vice president.

Besides providing administrative oversight to MGH research, the new office will play a role in technology development, i.e., the process by which a promising technological innovation is brought to the product stage. The MGH foresees revenue from the commercial application of many of its scientific achievements helping to provide institutional support for its growing research programs.



Dr. John J. Savarese, developer of a new anesthetic, created with support from the Office of Research and Technology Affairs



Dr. Smith remembered

Dr. Richard J. Smith, who joined our staff in 1972, was Chief of Hand Surgery in the MGH Orthopaedic Service and one of the world's foremost hand surgeons. He was an articulate scholar and teacher who lectured widely in his field and authored or coauthored over a hundred scientific articles. He was also recognized as a brilliant anatomist of the hand and an insightful analyst of its disorders. He served on numerous technical committees and was president of the American Society for Surgery of the Hand in 1982-83.

After a long illness, Dr. Smith died on March 30, 1987. He was 56.

Interpreter

More than 1,800 times last year a situation requiring a language interpreter arose at the MGH, often in the Emergency Ward. As the city becomes ever more diverse around us, the vital link of communication between the patient and the health-care provider comes under intense pressure. The health-care system is compelled to adapt. Language interpretation was once a service that could be dealt with well enough on the volunteer level; now intercultural relationships are commonplace in the hospital context and must be professionally managed.

To this end, we created the staff position of Coordinator of Interpreter Services at the MGH and hired Margarita Battle (center in photograph), an experienced interpreter and translator with fluency in four languages. The service will still rely on a group of about 250 employees, doctors, and hospital volunteers who provide interpreter services in 47 languages, but Mrs. Battle will link and monitor available interpreters with the patients and staff members who need them.

Patients

A spousal donation

At 43, Lawrence Cabral had been a diabetic for 30 years and had been undergoing dialysis three times a week for the previous year while seeking vainly for a kidney from a genetically appropriate kinsperson or cadaver. His wife Diana, 37, a registered nurse, conceived the idea of donating one of her own kidneys and secretly had tests done to make sure her tissue would be compatible with Lawrence's. When the test results were satisfactory, the couple went ahead. The operations were successful, and Lawrence expects to return to work soon.

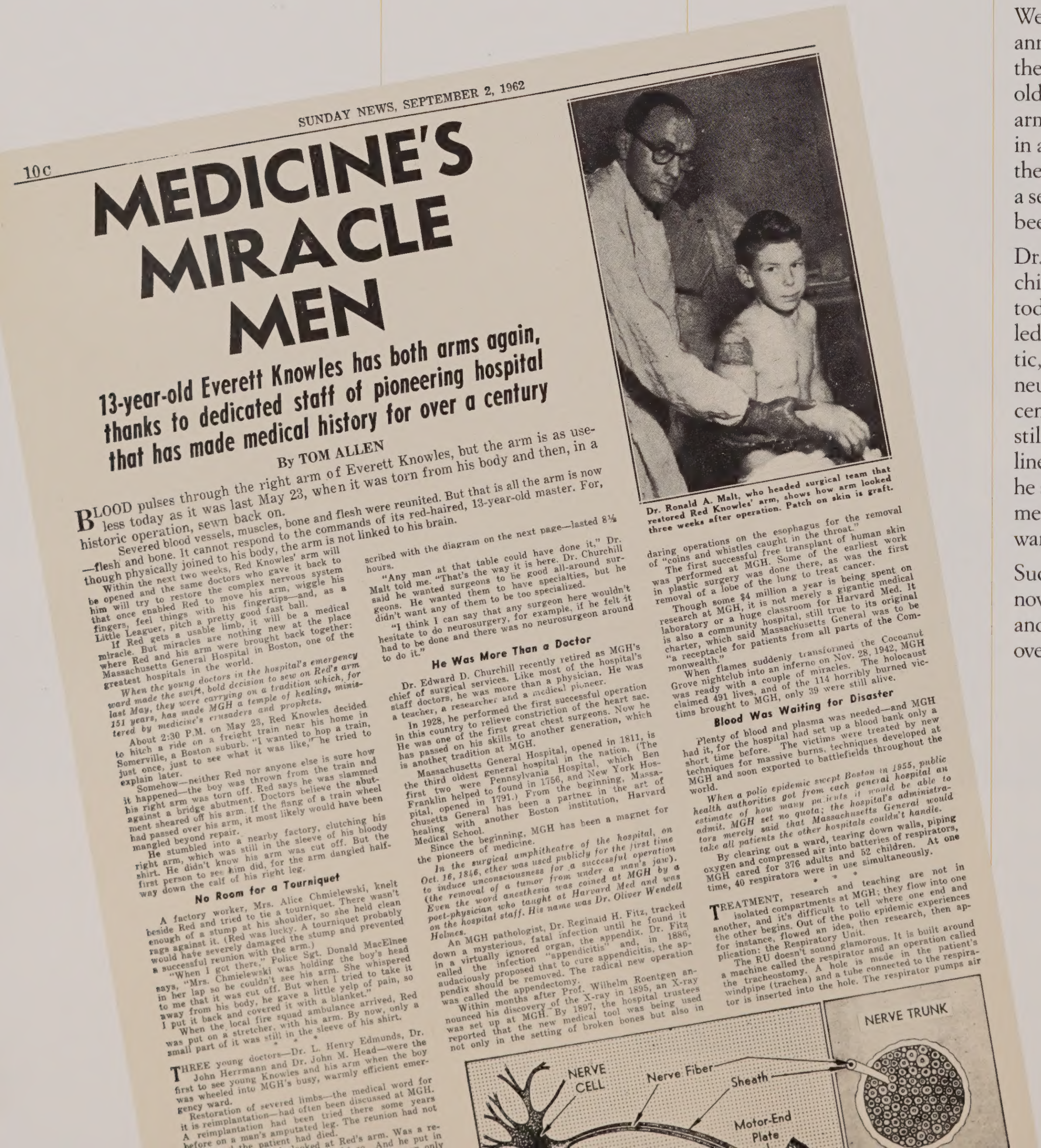
Kidney transplantations have been performed at the MGH for 25 years, but this was our first instance of spousal donation. Dr. Paul S. Russell, Chief of the MGH Transplantation Unit, points out that the use of genetically similar family donors has been accepted practice for more than 20 years now, but because of the severe shortage of donor organs, the spouse-to-spouse transplantation has become an alternative "we're just beginning to explore."

Replantation: 25 years ago

We marked the twenty-fifth anniversary during 1987 of the replantation of 12-year-old Everett Knowles' right arm, which had been severed in a railroad accident. It was the first time in history that a severed human limb had been successfully replanted.

Dr. Ronald A. Malt, then chief surgical resident and today an MGH staff surgeon, led a team consisting of plastic, vascular, orthopedic, and neurosurgeons. A quarter century later, Mr. Knowles is still employed in a vigorous line of work. "The accident," he says, "never prevented me from doing anything I wanted to do."

Successful limb replantations now number in the thousands and have been carried out all over the world.



SUNDAY NEWS, SEPTEMBER 2, 1962

10C

MEDICINE'S MIRACLE MEN

13-year-old Everett Knowles has both arms again, thanks to dedicated staff of pioneering hospital that has made medical history for over a century

By TOM ALLEN

BLOOD pulses through the right arm of Everett Knowles, but the arm is as useless today as it was last May 23, when it was torn from his body and then, in a historic operation, sewn back on.

Severed blood vessels, muscles, bone and flesh were reunited. But that is all the arm is now—flesh and bone. It cannot respond to the commands of its red-haired, 13-year-old master. For, though physically joined to his body, the arm is not linked to his brain.

Within the next two weeks, Red Knowles' arm will be opened and the same doctors who gave it back to him will try to restore the complex nervous system that once enabled Red to move his arm, wiggle his fingers, feel things with his fingertips—and, as a Little Leaguer, pitch a pretty good fast ball.

If Red gets a usable limb, it will be a medical miracle. But miracles are nothing new at the place where Red and his arm were brought back together: Massachusetts General Hospital in Boston, one of the greatest hospitals in the world.

When the young doctors in the hospital's emergency ward made the swift, bold decision to sew on Red's arm last May, they were carrying on a tradition which, for 151 years, has made MGH a temple of healing, ministered by medicine's crusaders and prophets.

About 2:30 P.M. on May 23, Red Knowles decided to hitch a ride on a freight train near his home in Somerville, a Boston suburb. "I wanted to hop a train, just once, just to see what it was like," he tried to explain later.

Somehow—neither Red nor anyone else is sure how it happened—the boy was thrown from the train and his right arm was torn off. Red says he was slammed against a bridge abutment. Doctors believe the abutment sheared off his arm. If the flang of a train wheel had passed over his arm, it most likely would have been mangled beyond repair.

He stumbled into a nearby factory, clutching his right arm, which was still in the sleeve of his bloody shirt. He didn't know his arm was cut off. But the first person to see him did, for the arm dangled halfway down the calf of his right leg.

No Room for a Tourniquet

A factory worker, Mrs. Alice Chmielewski, knelt beside Red and tried to tie a tourniquet. There wasn't enough of a stump at his shoulder, so she held clean rags against it. (Red was lucky. A tourniquet probably would have severely damaged the stump and prevented a successful reunion with the arm.)

"When I got there," Police Sgt. Donald MacElnee says, "Mrs. Chmielewski was holding the boy's head in her lap so he couldn't see his arm. She whispered to me that it was cut off. But when I tried to take it away from his body, he gave a little yelp of pain, so I put it back and covered it with a blanket."

When the local fire squad ambulance arrived, Red was put on a stretcher, with his arm. By now, only a small part of it was still in the sleeve of his shirt.

* * *

THREE young doctors—Dr. L. Henry Edmunds, Dr. John Herrmann and Dr. John M. Head—were the first to see young Knowles and his arm when the boy was wheeled into MGH's busy, warmly efficient emergency ward.

Restoration of severed limbs—the medical word for it is reimplantation—had often been discussed at MGH. A reimplantation had been tried there some years before on a man's amputated leg. The reunion had not

the patient had died.

looked at Red's arm. Was a re-

And he put in

only

scribed with the diagram on the next page—lasted 8½ hours.

"Any man at that table could have done it," Dr. Malt told me. "That's the way it is here. Dr. Churchill said he wanted surgeons to be good all-around surgeons. He wanted them to have specialties, but he didn't want any of them to be too specialized.

"I think I can say that any surgeon here wouldn't hesitate to do neurosurgery, for example, if he felt it had to be done and there was no neurosurgeon around to do it."

He Was More Than a Doctor

Dr. Edward D. Churchill recently retired as MGH's chief of surgical services. Like most of the hospital's staff doctors, he was more than a physician. He was a teacher, a researcher and a medical pioneer.

In 1928, he performed the first successful operation in this country to relieve constriction of the heart sac. He was one of the first great chest surgeons. Now he has passed on his skills to another generation, which is another tradition at MGH.

Massachusetts General Hospital, opened in 1811, is the third oldest general hospital in the nation. (The first two were Pennsylvania Hospital, which Ben Franklin helped to found in 1756, and New York Hospital, opened in 1791.) From the beginning, Massachusetts General has been a partner in the art of healing with another Boston institution, Harvard Medical School.

Since the beginning, MGH has been a magnet for the pioneers of medicine.

In the surgical amphitheatre of the hospital, on Oct. 16, 1846, ether was used publicly for the first time to induce unconsciousness for a successful operation (the removal of a tumor from under a man's jaw). Even the word anesthesia was coined at MGH by a poet-physician who taught at Harvard Med and was on the hospital staff. His name was Dr. Oliver Wendell Holmes.

An MGH pathologist, Dr. Reginald H. Fitz, tracked down a mysterious, fatal infection until he found it in a virtually ignored organ, the appendix. Dr. Fitz called the infection "appendicitis" and, in 1886, audaciously proposed that to cure appendicitis, the appendix should be removed. The radical new operation was called the appendectomy.

Within months after Prof. Wilhelm Roentgen announced his discovery of the X-ray in 1895, an X-ray was set up at MGH. By 1897, the hospital trustees reported that the new medical tool was being used not only in the setting of broken bones but also in daring operations on the esophagus for the removal of "coins and whistles caught in the throat."

The first successful free transplant of human skin was performed at MGH. Some of the earliest work in plastic surgery was done there, as was the first removal of a lobe of the lung to treat cancer.

Though some $4 million a year is being spent on research at MGH, it is not merely a gigantic medical laboratory or a huge classroom for Harvard Med. It is also a community hospital, still true to its original charter, which said Massachusetts General was to be "a receptacle for patients from all parts of the Commonwealth."

When flames suddenly transformed the Cocoanut Grove nightclub into an inferno on Nov. 28, 1942, MGH was ready with a couple of miracles. The holocaust claimed 491 lives, and of the 114 horribly burned victims brought to MGH, only 39 were still alive.

Blood Was Waiting for Disaster

Plenty of blood and plasma was needed—and MGH had it, for the hospital had set up a blood bank only a short time before. The victims were treated by new techniques for massive burns, techniques developed at MGH and soon exported to battlefields throughout the world.

When a polio epidemic swept Boston in 1955, public health authorities got from each general hospital an estimate of how many patients it would be able to admit. MGH set no quota; the hospital's administrators merely said that Massachusetts General would take all patients the other hospitals couldn't handle.

By clearing out a ward, tearing down walls, piping oxygen and compressed air into batteries of respirators, MGH cared for 376 adults and 52 children. At one time, 40 respirators were in use simultaneously.

* * *

TREATMENT, research and teaching are not in isolated compartments at MGH; they flow into one another, and it's difficult to tell where one end and the other begins. Out of the polio epidemic experiences for instance, flowed an idea, then research, then application: the Respiratory Unit.

The RU doesn't sound glamorous. It is built around a machine called the respirator and an operation called the tracheostomy. A hole is made in the patient's windpipe (trachea) and a tube connected to the respirator is inserted into the hole. The respirator pumps air

Dr. Ronald A. Malt, who headed surgical team that restored Red Knowles' arm, shows how arm looked three weeks after operation. Patch on skin is graft.

After Chernobyl

The MGH offered free screening for radioactive iodine 131, a product of nuclear fission, to adults and children traveling or living in Europe at the time of the Chernobyl meltdown in April 1986. Dr. Frank P. Castronovo, Jr., Radiopharmacologist in the Department of Radiation Safety, performed the screening. As published last year in the *Journal of Nuclear Medicine* (April 1987), our results showed that 43 (or 74 percent) of the 58 individuals who came in for screening had detectable amounts of iodine 131 in their thyroid gland. Most were within limits currently considered safe, but four of the eleven children showed concentrations of more than 1,000 millirems, and one Polish one-year-old received a dose of 37,000 millirems, more than a thousand times that of a chest X ray.

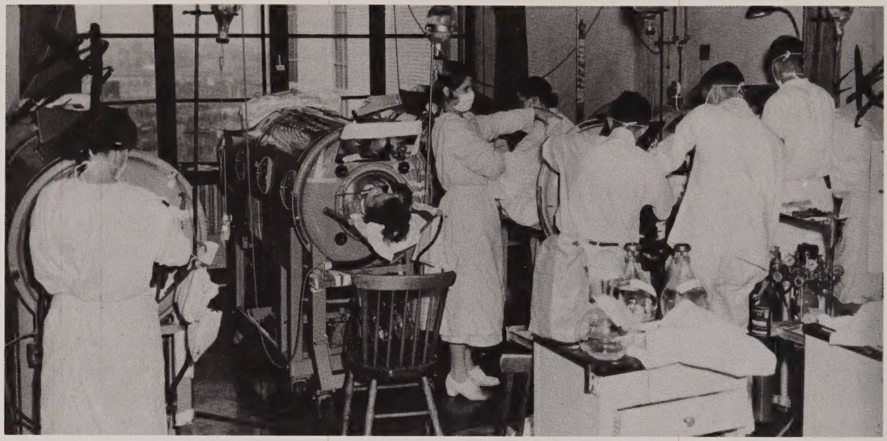
A burn survivor

Jerry Sickmeier came to us from Cahokia, Illinois, early in 1987 with burns covering 97 percent of his body, third-degree burns massively predominating, sustained when a gas leak exploded in his home while he slept. Only small patches of skin on his scalp and under his arms were not burned. He was 32 years of age. No adult ever seen at the MGH had ever survived such severe burns, nor was our staff aware of a worse case that yielded to treatment anywhere. The use of artificial skin developed by MGH, MIT, and the Shriners Burns Institute played a key role in Mr. Sickmeier's survival.

Mr. Sickmeier was transferred to the Barnes Hospital in St. Louis, near his home, about half a year later. He will continue his recovery and rehabilitation there for up to another year, after which he is expected to return to his old job.

New Programs

Iron lung machines for polio victims in 1955 epidemic



Post-polio clinic

Thirty or forty years after the onset of their crippling disease, many of the nation's 250,000 polio survivors are apparently being stricken by a second round of neurological deterioration.

It is known as Post-Polio Syndrome (PPS). It is characterized by severe muscular weakness, pain in muscles and joints, fatigue, difficulty in breathing, and intolerance of cold. It is afflicting men and women who had polio, had symptoms serious enough to require hospitalization, and had suffered neurological damage in at least two limbs. In many cases, it is severe enough to cause marked or drastic worsening of the patient's life-style. Former ambulatory survivors may now require wheelchairs; others find themselves needing respirators at night. Tens of thousands of patients nationally and thousands in New England alone appear to have been stricken.

To help address these patients' new problems, Dr. Robert H. Brown of the MGH and the Spaulding Rehabilitation Hospital established this year a clinic for the treatment of PPS. The clinic is held on the first Monday of each month in Spaulding's outpatient department.

Nursing home and Alzheimer's

We announced plans last year to build a 300-bed nursing home in the North Point section of Cambridge, just across the Charles River from the MGH main campus.

About 200 of these beds will provide traditional nursing home services, for which there is a critical need in the Boston-Cambridge area.

The other third, however, will be set apart in a specially designed unit reserved for patients with Alzheimer's disease (AD) or related disorders involving long-term, irreversible mental deterioration leading to an ultimate need for institutionalization.

The project will be supported in part by the Massachusetts Department of Public Welfare, which has launched a pilot program, to find ways to keep AD patients independent longer and more humanely protected from their condition than is feasible in conventional nursing-home settings.

Brain-tumor center

The MGH last year opened its Brain Tumor Center, an ambulatory clinic on the first floor of the Cox Building.

Tumors of the nervous system and especially of the brain itself are among our most feared diseases because they can affect the personality and because they can be extremely difficult to treat.

But as a result of recent advances in surgery, radiation, and medical therapies, specialists are often merging all three basic modes of treatment.

The Brain Tumor Center, we believe, will soon become a focal point for the multidisciplinary approach to tumors of the nervous system.

Home care

Space-age technology has made home treatment feasible for a large number of illnesses that previously required hospitalization. Some patients, for example, are perfectly capable of managing their own intravenous therapy at home, even at work, if they are only given the means of doing so. Parents often can administer their child's intravenous antibiotic in the nursery without professional assistance.

The enormous demand for hospital rooms, of course, is one big reason why health-care costs keep rising. If patients for whom home care is possible and appropriate can be given the means to carry it out, the benefits will extend to all who use the health-care system. Someone who cannot do without it has access to a hospital room, and the at-home patient's costs can be cut (according to one recent study) by 60 to 90 percent. Moreover, patients as a rule have better morale and do better medically when they are at home and actively involved in their own treatment.

These thoughts formed our perspective last year as we joined forces with another leading Boston hospital, the New England Medical Center, and Caremark, Inc., a home-care company known for its advanced technology, as partners in New England Health Resources (NEHR). A private company founded by our partners in 1984, the NEHR provides sophisticated home care to seriously or chronically ill patients, including primarily those who need intravenous antibiotic therapy for major infections, chemotherapy for cancer, and intravenous pain medication for chronic pain.

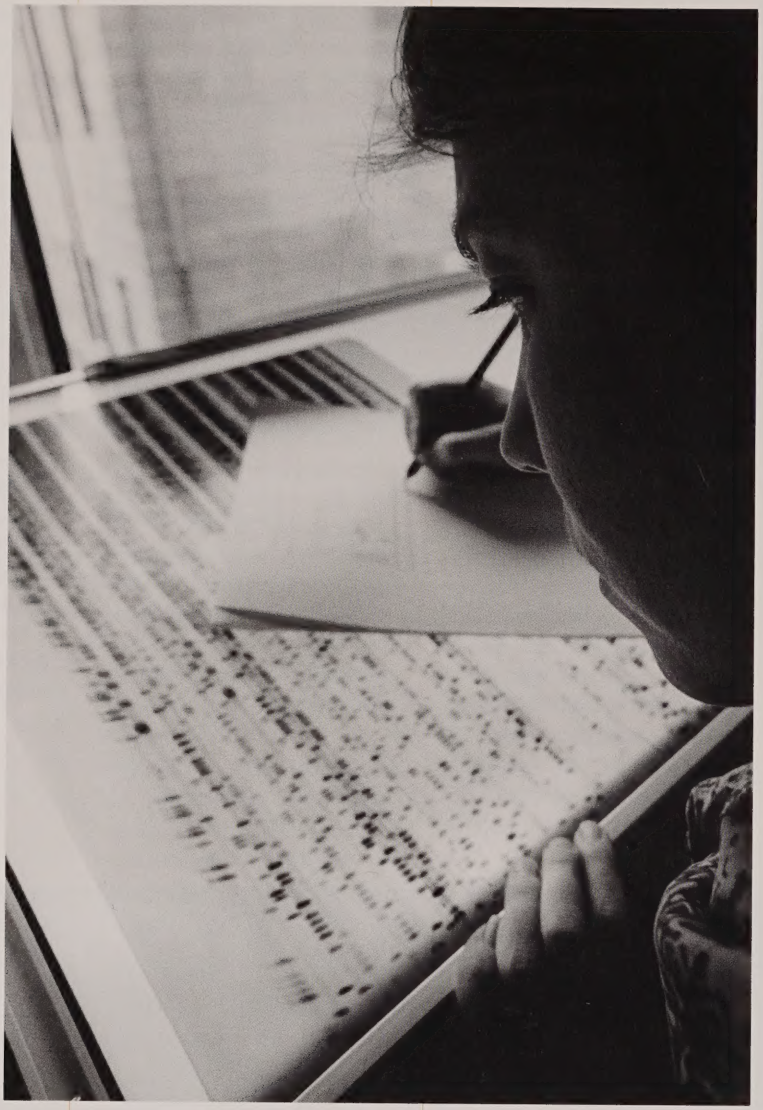
Said MGH General Director J. Robert Buchanan in announcing the new partnership, "New England Health Resources leads a new trend in health care. It benefits the patients by getting them back home so much quicker than before. It benefits society by reducing costs of health care. And it provides the hospitals with a source of badly needed income at a time of fiscal constraints."

A merger

Clinical Administration was merged into the Department of Nursing in June of 1987. The Clinical Administration staff is responsible for management of the patient record, monitoring supplies and budgets, and nonclinical operational activities on the inpatient units. The goal of Clinical Administration is to provide a smooth environment in which clinicians can give the best possible patient care. Clinical Administration staff works with all departments on the patient care units. Patti Rager, RN, MSN, Director of Nursing Support Services, was appointed by Yvonne Munn, Associate General Director and Director of Nursing, to direct the merger.

Sue Flynn, RN, of New England Health Resources, works with an AIDS patient in his home.

Research and Technology



A neurogeneticist studies an image of a DNA sequence.

Alzheimer's disease

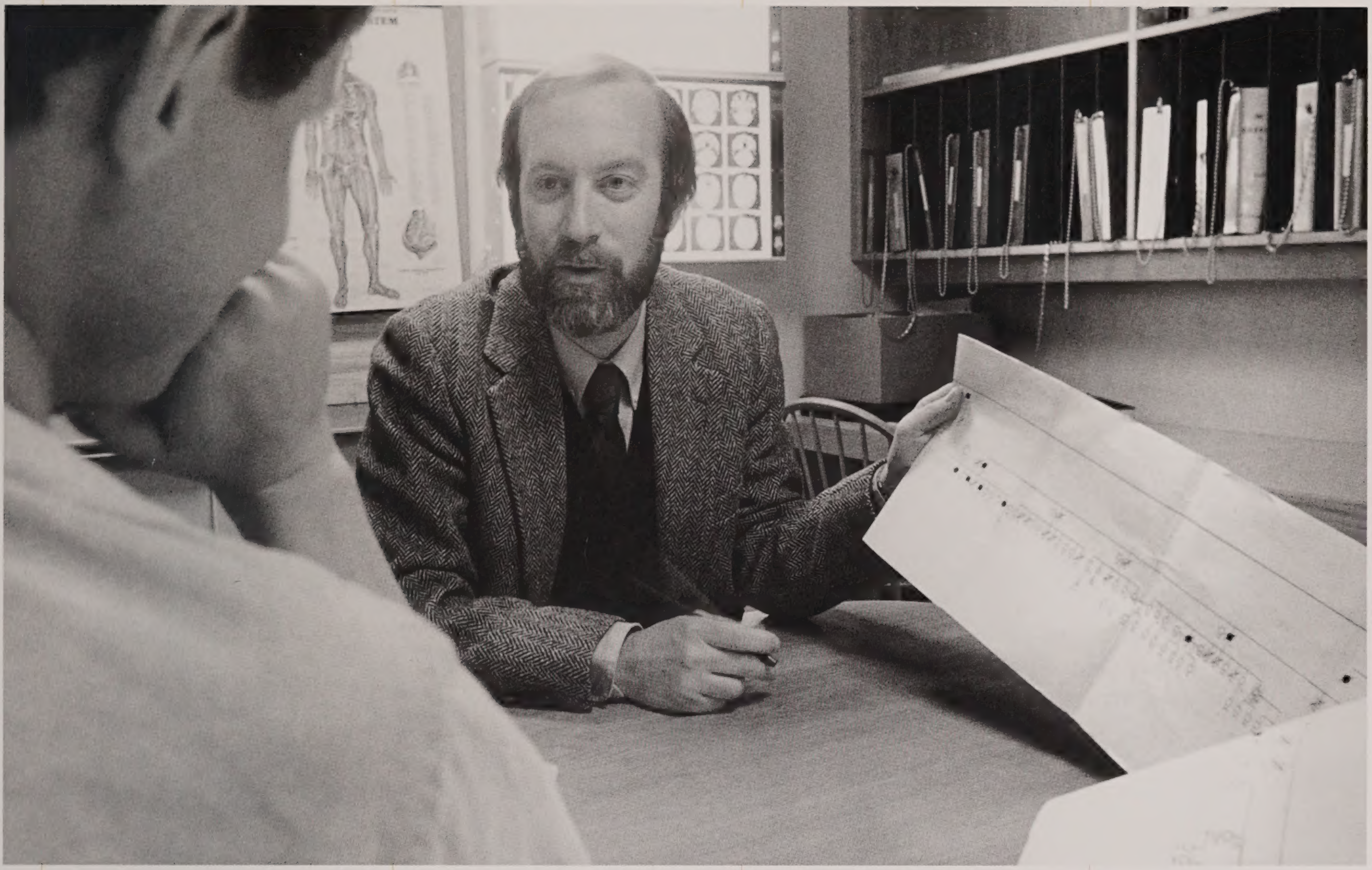
An international team led by MGH neurogeneticists made advances this year on three different inherited disorders. At the same time these MGH investigators from the laboratory of Dr. James F. Gusella saw progress on a test they developed for still another such disease:

The cause of Alzheimer's disease (AD) is unknown, and most cases seem not to be inherited, but an international team led by MGH Research Fellow Peter H. St. George-Hyslop, MD, reported the discovery that the familial form of the memory disorder is caused by a gene or a genetic defect in a region of chromosome 21. Understanding the familial form of the disease may also aid the elucidation of the noninherited form.

"Elephant Man's Disease"

Von Recklinghausen's neurofibromatosis (the so-called "Elephant Man's Disease") is one of the most common inherited diseases, but it is still not known which gene or group of genes is involved in its transmission. A big step toward the answer was taken this year by MGH neurogeneticists, leaders of an international research team, in reporting the discovery of a DNA marker for the sought-after gene on chromosome 17. The same group of researchers discovered a marker on chromosome 22 for bilateral acoustic neurofibromatosis, a less common but generally much more severe neurological disease, characterized by multiple tumors of the brain and spinal cord.

The ultimate payoff in terms of health care will be development of much needed diagnostic tests for both forms of neurofibromatosis, and eventually a possible treatment or even cure.



Richard Myers, Ph.D., a medical geneticist, uses a family tree to advise about the risks of developing Huntington's disease.

Huntington's disease

An estimated 100,000 Americans are at risk for Huntington's disease (HD), a progressive brain affliction leading to loss of motor control and intellectual function. There is no cure, but experimental tests now being conducted at the MGH (along with Johns Hopkins University in Baltimore and the University of British Columbia in Vancouver) now appear to predict with 95 percent accuracy whether a member of a family at risk for HD will actually contract the disease. The disease does not usually appear before a person's 40s or late 30s; thus, the new test could help guide a young adult in decisions affecting career, marriage, and family.

The MGH, which in 1983 made the landmark finding of a genetic marker for HD, currently plans to test and counsel 50 persons a year for the next two years. Candidates are selected after careful genetic and psychological screening to ensure that a clear family history of the disease is available and that the individual applying for the test be sufficiently strong and well supported to cope with a positive test result.

Research and Technology

AIDS: AZT and ribavirin do not mix

In medicine, two rights can make a wrong. Two drugs used with some reported clinical success in the struggle with AIDS, azidothymidine (AZT) and ribavirin, appear to diminish each other's effectiveness when used together. Each drug appears to work better by itself.

This fact—that AZT and ribavirin don't mix—was established in laboratory (nonpatient) tests completed last year by an MGH research team which in fact was hoping to find an additive relationship between the two medications. In another test conducted last year at the MGH Virology Lab, researchers discovered that interferon was more effective against the AIDS virus when used in combination with AZT than would be expected by adding their individual effects; in other words, they had synergistic antiviral effects.

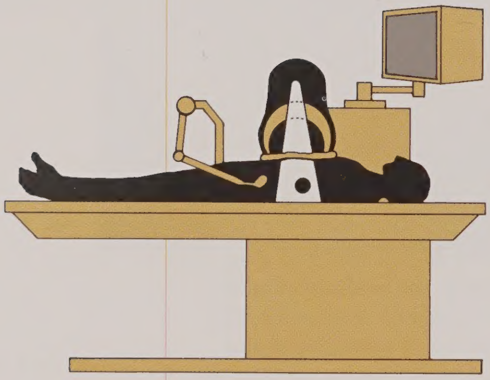
Establishing that AZT and ribavirin don't mix may be an important discovery. According to Dr. Martin S. Hirsch, head of AIDS research at the MGH, "Both AZT and ribavirin are available to patients who wish to take them. It is a natural temptation for people who are desperate and fear for their lives to attempt to combine these drugs. Until we have studied this combination further, it appears that those who combine them may be doing themselves real harm."

AIDS: a vaccine test

The long, hard search for an AIDS vaccine is at best years away from ultimate success.

But small steps forward continue to be made. Among them, MGH and National Institutes of Health scientists reported discovery last year of certain killer cells, known as cytotoxic T lymphocytes, that can attack cells infected with the AIDS virus.

Such cells were believed to exist, but this is the first time their existence has been demonstrated. Now immunologists have a means of measuring the probable effectiveness of candidate AIDS vaccines.



Lithotripter for gallstones

A new high-technology device that can treat painful gallstone conditions without surgery was purchased jointly this year by the MGH and the New England Medical Center and will be available for use in 1988.

The million-dollar German-built lithotripter, or stone crusher, works by concentrating acoustical shock waves on the gallstones in the gallbladder and disintegrating them into a powder that is usually expelled spontaneously from the bile ducts. Of 175 patients treated on this device in Germany for whom an extended record is available, 174 were completely cleared of stones after one to six months. Two thirds were treated without anesthesia of any kind; most of the others were content with mild sedation. Compared to an average hospital stay of 8.6 days for gallbladder surgery, lithotripsy patients averaged less than three.

A similar device, the kidney lithotripter, made news in 1984 when it disintegrated the kidney stones of patients who otherwise would have required surgical treatment. The MGH was the second hospital in the United States to begin trials with this now widely used machine.

About 10 times more common than kidney stones, gallstones are thought to afflict about 16 to 20 million Americans, although only a portion of them have symptoms. Currently, about 475,000 Americans are operated on for gallstones every year. Lithotripsy points to a future in which gallstones and kidney stones as well may be treated routinely on an outpatient basis.

Hip fractures in the elderly

There were some 200,000 cases of hip fracture recorded in the United States in 1970, most of the victims elderly women. By the year 2000, experts expect the number to reach a half million. Hip-fracture patients already account for over half of all days spent in hospitals for broken bones.

An MGH study begun in 1983 by Alan M. Jette, Ph.D., Interim President of the MGH Institute of Health Professions and Director of the Graduate Program in Physical Therapy, has worrisome results. They indicate that despite the best care fewer than half the patients regain their prefracture function, and the demand for rehabilitation and care services for hip-fracture victims will continue to increase despite our best medical efforts.

Computerized diagnostic tool

The MGH Laboratory of Computer Science in collaboration with The American Medical Association has devised a computer science program to aid physicians in diagnosis.

Called DXplain, the new program allows physicians to enter a patient care description, then to receive from the computer a ranked list of diagnoses that should be considered. The program in no way supplants the skilled physician. DXplain is available nationwide over a standard telecommunications network. But with its ability to understand more than 4,700 clinical and laboratory terms, its data base of over 2,000 diseases, and its more than 65,000 disease term relationships, DXplain provides the practicing physician in an ever more complicated medical world with easy access to a computer-stored knowledge base of diagnoses and their associated signs and symptoms.

Chairman's Report

A milestone was reached in 1987 that was overlooked by many at our busy hospital who are understandably more interested in the care of the sick than construction. On October 26 drilling began to set the 52 concrete caissons for the foundation for the first new patient care building. This "new" hospital built on existing hospital grounds will be 24 stories tall and house 344 patient beds for pediatrics, neurology, surgery, orthopedics, cardiology, and gynecology patients. The first phase is expected to be completed in 1990. The Phillips House beds will be relocated to a new Phillips House occupying the 17th through the 19th stories. When structure one is complete, the Baker Building will be razed to make room for a second, 15-story building housing 223 beds. Combined with renovations in the White and Gray/Bigelow/Jackson complex, the hospital will have a total of 977 renewed beds.

Fiscal year 1987 also marked a milestone in the Capital Campaign with its goal of $169 million, half of which supports the new facilities. At fiscal year end on September 30, the Campaign had reached $122 million, an unprecedented achievement, and as of this writing the total has further increased to $130 million.

The result of this generosity will be to create state-of-the art facilities for our patients and staff. These facilities will accommodate the technologies of the next century and be far more cost effective than our current, dated physical plant.

The Trustees have committed their full energies to reaching this goal while fully recognizing the challenge of the task. I cannot find better words than those of my predecessor, Mr. Francis H. Burr, who wrote in the last annual report, "Nothing is more difficult than raising money for bricks and mortar. But nothing is more important." It is clear that the fundamental health of the institution depends upon our raising these capital dollars. The friends of the MGH have responded with great generosity, and we feel confident in continuing to call upon their beneficence to reach our goal.

The past year witnessed a great loss to the MGH in the death of Mr. Arthur O. Wellman. In helping to launch the Capital Campaign in 1981, Mr. Wellman made the largest commitment in the history of the MGH. His extraordinary generosity was honored by the Trustees in naming the Wellman Research Building.

While the difficult and important work goes on to rebuild the physical plant, the patient care and intellectual achievements also build and grow at an unprecedented rate. In the preceding pages you have read of the hospital's reaffirmation of its leading role in cancer research and therapy through the augmentation of our Cancer Center. Research related to heart, neurology, and other diseases continues unabated and at a quality that builds on our tradition of leadership. Research support for fiscal year 1987 totaled $79 million (from federal, industrial, and private sources) and represented a 14% increase over the previous year.

The commitment to biomedical research was most visibly exhibited in the Corporation's decision to lease nearly 380,000 square feet in Building 149 in the Charlestown

Navy Yard. This former Navy parts depot is undergoing a remarkable metamorphosis into ultramodern biomedical laboratories. Through this single initiative MGH research space has more than doubled.

The McLean Hospital celebrated the contributions of Francis de Marneffe as he retired after serving 25 years as General Director. Dr. Shervert Frazier, who returned to McLean from his position as Director of the National Institute of Mental Health, was named his successor. McLean continues its leadership as one of the premier psychiatric hospitals in the country.

Foxhill Village Continuing Care Retirement Community, in which the MGH Health Services Corporation is a joint venture partner, began selling units in Westwood. And New England Health Resources, a joint venture with New England Medical Center and Caremark, Inc., earned a surplus in the first year of operation with the MGH Health Services Corporation as a partner. The company is a provider of home health services and earned a surplus that will help subsidize MGH operations and services that are not self-sustaining.

The leadership of the MGH Institute of Health Professions began a transition due to the departure of its President, Dr. Stephen N. Collier, and the appointment of Dr. Alan M. Jette as Interim President.

The most striking characteristic of the past year, however, lies in the ability of the MGH to build responsibly for the future in spite of a difficult external environment. Neither budget deficits resulting from unresolved state payment laws nor the pressures of continuously operating at full patient capacity have deterred the General's forward direction.

I would like to take this opportunity to thank individuals who give so selflessly to this institution. We shall strive in the future to uphold the traditions of the past by maintaining the quality standards in patient care, research, and teaching for which this institution is so well known.

W. Nicholas Thorndike

Model of new inpatient building

General Director's Report

These are exciting times! We have a new Radiology chief, a new chief of Dermatology, a new director for our Emergency Ward, and a new chief of Gynecology. All are outstanding physicians who are in turn replacing men of great distinction. We are deep in the ground with the first of our new patient buildings. We have committed 380,000 square feet of space in the Charlestown Navy Yard to meet the need for additional research laboratories. The Bartlett Hall Extension is up and partly open. All but two floors in the White Building have been *completely* modernized. What makes these and other accomplishments so unusual is that we have managed to achieve them despite a continuing uncertainty in our environment. As I write this, some five months past the 1986–87 fiscal year, a new health care bill is being debated in the Massachusetts legislature. And none too soon. We have lost $5 million in just the first four months of the 1987–88 fiscal year. The new bill will not solve our financial problems, far from it. But (depending on its final form) the measure should reduce those problems and eliminate the ambiguity we have been living with. We will not be able to restore reductions we have had to make in our services, such as in the staffing of information desks and in the provision of other amenities patients and their families so appreciate.

One thing about our environment has not been uncertain, and that is that the people who seek our care appreciate us and support us. The quality of leaders we attract continues to position us well for the resources essential to our patient care, research, and education activities. The greatest uncertainty has been in *the most important area* —the level of support for patient care. So far, through careful cost cutting, we have maintained the quality, if not always some of the nonmedical components, of that program. What concerns us immediately is the potential in Boston hospitals for loss of amenities for patients and, ultimately, for loss of either quality and/or specific patient care programs themselves. In patient care we continue to remain at the mercy of governmental controls.

Essential to the quality of what we do is the availability of people to do it. The issues surrounding the shortages of person power in health care are only partly dominated by dollars. Hospitals have a real problem in attracting young nurses and other professional care givers to some of the tasks that need to be done for patients. The total number of young people who are making career choices is down because that is the variation of the biorhythm of our society. And given the cost of preparing for the caretaking professions, for an equal investment of time, energy, and money, they seek greater opportunities elsewhere. That is particularly true of the women who traditionally have constituted a very large part of that caretaking work force. When we sing the old song that now there are more women enrolled in the first year of medical schools than in the first year of nursing schools, we put the whole issue in sharp relief. The problems continue, but as in the past 176 years the opportunities to move ahead in certain areas are also present. We try to seize those, maximize them, and by so doing

Mr. Thorndike and Dr. Buchanan

continue to create centers of great strength throughout this institution. The fact is that we have raised $130 million toward our goal of $169 million. . . . I don't know how many hospitals have been able to do that.

We are committed to centers of excellence, and our excellent service chiefs make this possible. It is getting tougher and tougher to find professional leaders with the expertise required in the triad of patient care, research, and teaching. I think the institutions that are going to do well are those that, through a variety of mechanisms, provide other levels of leadership for various components of the great services. I see the creation of research centers focused on broad areas of research such as cancer, neurologic disorders, and cardiovascular disease as a way of bringing brilliant investigators to conduct science and to administer the scientific portion of our programs while retaining their functional relationship to traditional patient care.

For the MGH, the creation of research centers is an experiment in looking at new organizational forms for our institution. This experiment is one I look forward to as an exciting way to maintain the MGH in its leadership position among America's teaching hospitals and biomedical research centers.

Elsewhere in this report you have read of some of the achievements of the past fiscal year. On the patient care side, we will have a new device to shatter gallstones. We also have a significant armamentarium of MRIs to image a variety of lesions more clearly than ever. Our pancreas transplantation program has been impressive. And so on. With research unencumbered by the governmental cost controls lingering over patient care, we have had another productive year. Our neurogeneticists have found markers for two different inherited diseases: familial Alzheimer's and neurofibromatosis (the so-called "Elephant Man's Disease"). Our cardiologists have developed an important new test for heart attacks. We have continued to make progress in our laboratories devoted to AIDS research. These are but a few of the "headlines" for some of the many advances during the 12-month period covered by this report. Some have already been brought to the bedside. I know you will share my excitement about these achievements.

Robert Buchanan.

J. Robert Buchanan, M.D.

The General Hospital Corporation

Excerpts from audited financial statements (in thousands of dollars)

Income	**1987***	**1986****
From patient care	$373,346	$368,425
Less contractual allowances	41,527	68,894
	331,819	299,531
Research and other specific purposes	86,412	81,414
Other	17,310	17,294
Total Operating Revenue	435,541	398,239

Expenditures		
For operating expenses: Salaries and related compensation	$213,840	$194,701
Supplies, expenses, depreciation	149,447	134,847
	363,287	329,548
Research and other specific expenses	71,286	65,643
	434,573	395,191
Surplus (Loss) from operations	968	3,048
Other income	2,116	660
Surplus (Loss)	3,084	3,708

*Year ending September 30, 1987

**Certain amounts in fiscal year ending 1986 have been reclassified to permit comparison.

The Hospital's Dollar	
Diagnostic and Therapeutic Services: *Diagnostic services, therapeutic services, house staff and professional staff, drugs, supplies, etc.*	51.0%
Nursing Care	16.0%
Plant and Equipment: *Depreciation, interest, energy, telephone, maintenance*	12.0%
Room and Board Services: *Food, laundry, security, housekeeping*	7.8%
Administrative Services: *Computer, accounting, administrative salaries, etc.*	13.2%

Massachusetts General Hospital

Facts and Figures

October 1, 1986– September 30, 1987	
Beds	1,081
Number of Admissions	34,095
Number of Ambulatory Visits	484,857
Inpatient Surgery	18,428
Emergency Ward Visits	72,000
Day Surgery	8,492
Active Staff	1,644
Clinical Fellows	280
Residents	411
Research Fellows	306
RNs	1,200
LPNs	66
Nursing Assistants	58
Volunteers	850
Employees	9,460

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Ways of Giving

Not long after its founding in 1811, a public campaign was launched to raise funds for the first building of the MGH. Citizens from all walks of life made contributions, ranging from 25 cents to $15,000.

One hundred seventy-six years later, the MGH continues to rely heavily on voluntary contributions to insure the hospital's leadership in patient care, medical training, and research. Again the greatest need is for buildings; the oldest inpatient buildings must be replaced with modern, efficient facilities in order to maintain the highest standard of patient care. Our current Capital Campaign reached $121,797,515 in FY 1987 toward the goal of $169 million by September 30, 1989.

Today there are many ways of giving made possible by federal laws enacted to encourage charitable contributions.

The simplest way for you to support the hospital is a gift of cash, which earns an income tax deduction if you itemize your deductions. Gifts of appreciated securities offer two advantages. In addition to a tax deduction of their full fair market value, they avoid taxation on the appreciated portion, now taxed at ordinary income rates. Other assets that may be used to make an outright gift include real estate, personal property, life insurance, and business interests. Many business firms have matching gift programs that double or even triple the value of a gift to the MGH.

If you want to make a substantial contribution to the MGH but need to retain your sources of income for yourself or other family members, you may want to consider a life income gift. The principal of such a gift is invested and a percentage of the income earned is paid to you or another beneficiary for life. The principal of the gift comes to the MGH only after the last beneficiary dies. When you make the gift, you receive a tax deduction based on the actuarial future value of the gift to the hospital. The most popular means of making such a gift is the pooled income fund, much like a mutual fund, in which the donor's gift is pooled with the gifts of others for investment purposes. The donor or other beneficiary receives a proportionate share of the income. Other life income plans can be individually tailored to your needs.

Bequests have been the largest source of funds for building the MGH over the years. A gift to the MGH in your will allows you to reduce the amount of taxes your estate might have to pay. Your bequest can be a specific dollar amount or all or part of the residue of your estate. Any of the arrangements that can be established during your lifetime can also be established by will, but without the advantage of a current income tax deduction.

For more information about giving to the MGH or about bequests or the tax-saving and income-producing advantages of planned giving, please call or write the Resources and Development Office:

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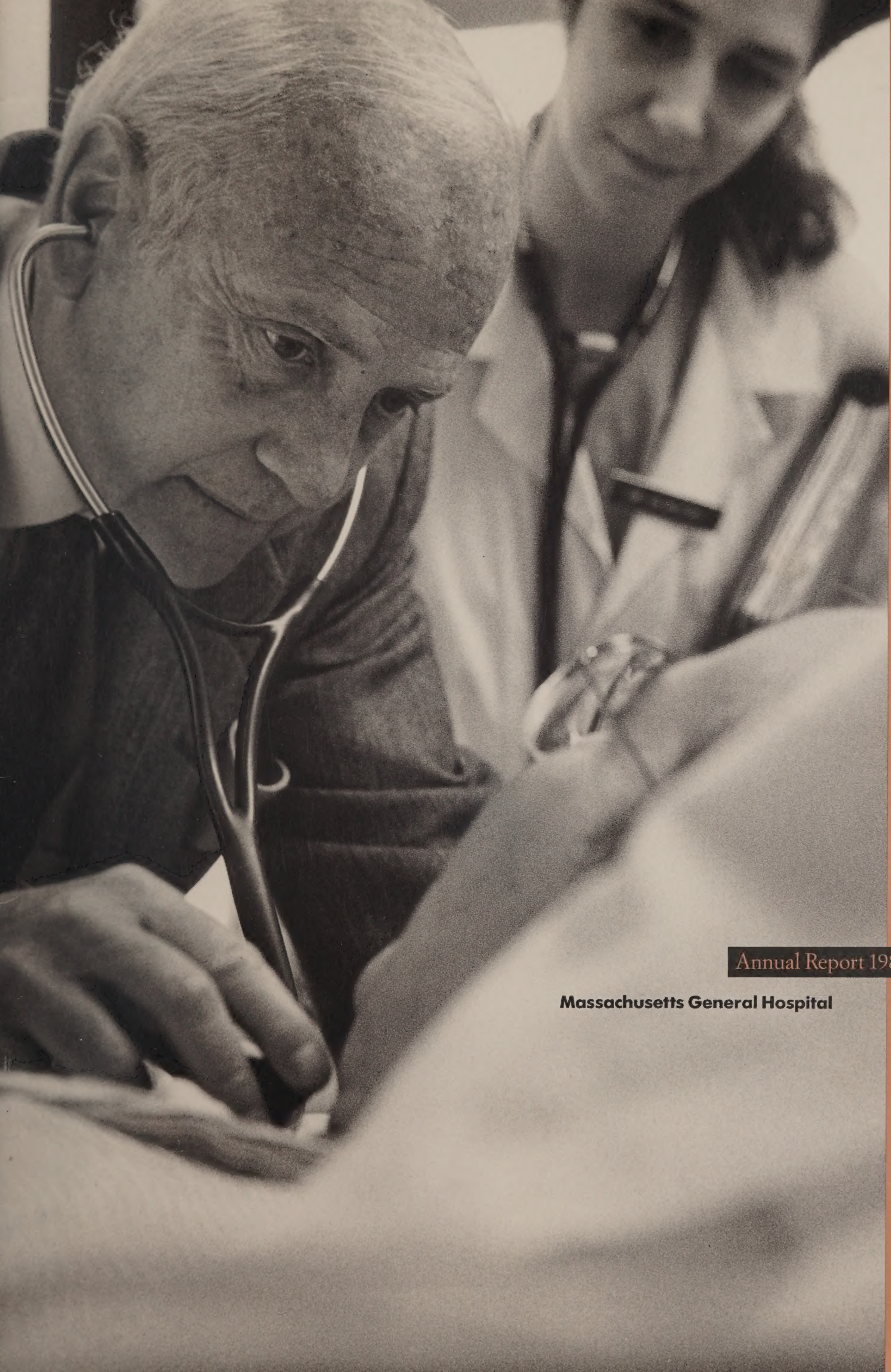


Annual Report 1988

Massachusetts General Hospital

Cover
Dr. W. Gerald Austen, Surgeon-in-Chief,
and Dr. Jo Buyske, second-year surgical resident.

Education at the MGH 2
Patient Care 16
Progress in Research 20
People and Medicine 22
Chairman's Report 24
General Director's Report 26
Finance, Facts, Figures 28
Ways of Giving 32

Education

At the MGH, a quiet commitment

IN A CITY of great institutions of learning, the Massachusetts General Hospital is an impressive educational center in its own right.

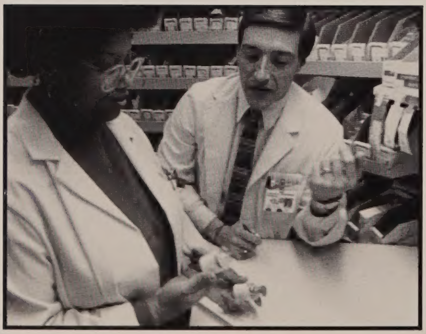
On any given day at the hospital, you could — if you knew where to look — witness the learning process under way in a range of settings: in a hallway, where a senior physician is quietly answering questions from a cluster of accompanying residents and medical students (photo, right); in a radiology lab, where technicians are learning how to operate the latest in imaging technology; in a seminar room, where a visiting researcher talks to staff social workers on new findings about family dynamics; in a pharmacy, where a senior pharmacist briefs students on the MGH's systems for ensuring that all patients get the right medications at the right time (photo, below).

In fact, educational activity is going on throughout the hospital around the clock — a fact that's not surprising when you consider a few numbers:

Roughly 450 medical school students receive part of their training at the hospital each year, and so do more than 300 students from area nursing schools. The MGH has about 400 residents, young physicians honing the skills that will help them become outstanding practitioners, and another 600 fellows — M.D.s and Ph.D.s receiving advanced training in the hospital's clinical units or research labs.

There are numerous other training programs as well, serving students in fields from dietetics to occupational therapy. In the course of a year, in fact, more than 2,000 individuals are in formal training at the MGH — and that's not to mention the thousands of employees who take advantage of the educational opportunities the hospital provides them. Nor does it include the instruction employees provide patients.

No wonder that Dr. J. Robert Buchanan, the hospital's General Director, says one of the things that struck him when he arrived seven years ago was the array of educational options the MGH had to offer. Much of this learning activity, though, is what Dr. Henry J. Mankin, Chief of Orthopaedics, calls "education with a small 'e.'" It's carried out quietly, and often in connection with our main responsibility, which is caring for patients.

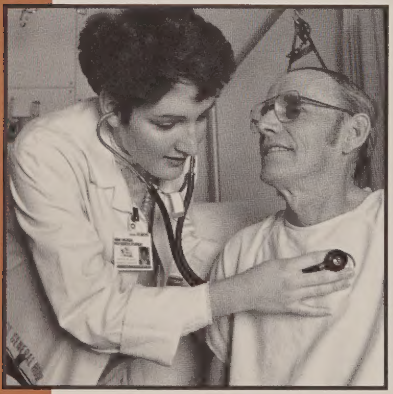


The MGH, founded by two Harvard professors in 1811, came naturally to its educational role. Those two men—Dr. James Jackson and Dr. John C. Warren—set the MGH on a course that ensured continued close ties with Harvard Medical School and a lasting commitment to education. It's not surprising, therefore, that when the teaching hospital in its modern form came into existence, starting around the turn of this century, we were in the vanguard.

Today, as one of the nation's major teaching hospitals, the MGH has broad-ranging educational responsibilities. It serves as a setting in which medical students gain first-hand exposure to the subtleties and complexities of patient care. As Harvard Medical School's oldest and largest teaching affiliate, the MGH trains students mainly from that school, though many others send top students as well.

The MGH, through its residency programs, also provides specialty training for young physicians. It performs similar services for a range of other kinds of health professionals. It also offers a rich menu of classes and other learning opportunities for patients and their families.

There's more to being a teaching hospital, of course, than educational responsibilities. The MGH, like other major teaching hospitals, also carries out a great deal of research, and it provides a disproportionate amount of care to patients who cannot afford to pay for the service.



Teaching hospitals are thought to provide care of better-than-usual quality. We think our care is of exceptional quality—and that our involvement in education is a key reason why.

It starts with the staff, says Dr. Paul S. Russell, Chief of the MGH Transplantation Unit. For example, the fact that MGH physicians hold Harvard Medical School appointments as well means prospective staff physicians have to pass muster with two of the nation's premier medical institutions before being hired.

But it goes far beyond that. At the MGH, the combination of a strong research focus and the presence of bright young people fosters a drive for excellence. As Dr. Russell notes, "We constantly ask ourselves, 'Isn't there a better way to do this?'"

That is the kind of attitude which explains why Dr. George Packer Berry, former dean of Harvard Medical School, could describe the hospital as "the finest achievement of American medicine;" why, each year, the MGH draws the nation's top young professionals to train here and hundreds of patients from nations around the world.

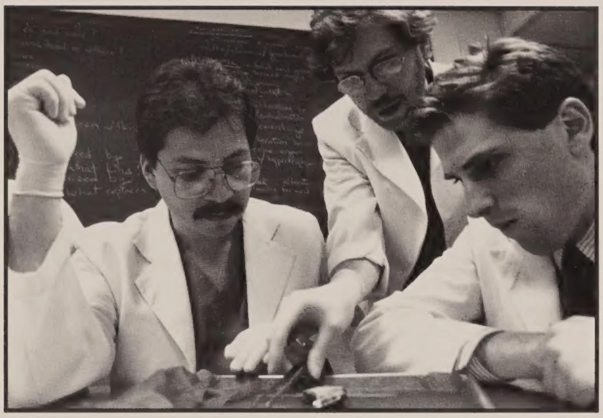
Yet today the hospital's educational activities are under growing pressure. The federal government has been steadily cutting the allowance it makes for teaching costs when calculating Medicare payments. Other governmental actions are boosting the MGH's educational responsibilities: A new state policy, for example, mandates yearly courses covering on-the-job training in AIDS precautions for each of the hospital's 9,500 employees.

Those responsibilities had been mounting anyway, driven by the growing complexity of modern medical care.

That trend, says Dr. Buchanan, "means we have more kinds of personnel to train, and more complicated concepts, techniques and processes to convey."

The hospital must deal with other realities, too. The sharp rise in area real estate prices, coupled with such factors as the high cost of malpractice insurance, threatens to make it harder to hire outstanding young physicians. "We've had to go to some lengths to figure out ways to attract the best people in spite of the high costs of housing," says Dr. W. Gerald Austen, Chief of Surgical Services.

Despite such pressure, there's a spirit at work that's helping sustain the quality of the hospital's educational enterprise. Dr. Jonathan F. Borus, who chairs the MGH's Executive Committee on Teaching and Education, traces the spirit to the close ties between the quality of care and education. "If there were educational cutbacks," he says, "the quality of patient care would suffer because the opportunities to teach and necessity to continue learning keep MGH professionals at the cutting edge of excellence in their clinical care."



Residents

Preparing for leadership

The residency is the experience that transforms medical school graduates from individuals who've acquired a large storehouse of the latest knowledge into capable, experienced physicians. Dr. Roger J. Pomerantz, the MGH's chief medical resident, says that the internship year—the first year of residency—is especially critical. "You'll never learn more in your whole life than you do in that year," he says.

The MGH tradition has been to bring in medical school graduates so motivated and bright that the transition can be a smooth, productive experience for patients and residents alike. But there's more to it than that. We also seek out young people who show promise of becoming medicine's future leaders.

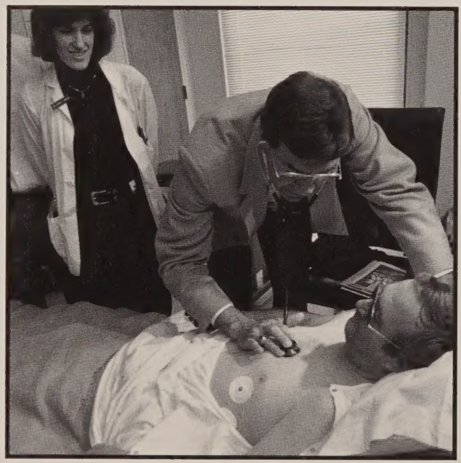
How do we accomplish this? "It's not simply to look for academic stars," says Dr. Andrew G. Bodnar, head of residency training in internal medicine. "To be sure, the hospital wants top students, and it gets them. Academic performance, though, is just the starting point for putting together an outstanding class of residents. Crucial, as well, is the issue of what kind of doctors students will make. Are they compassionate? Do they understand that medicine requires excellent judgment and listening skills?"

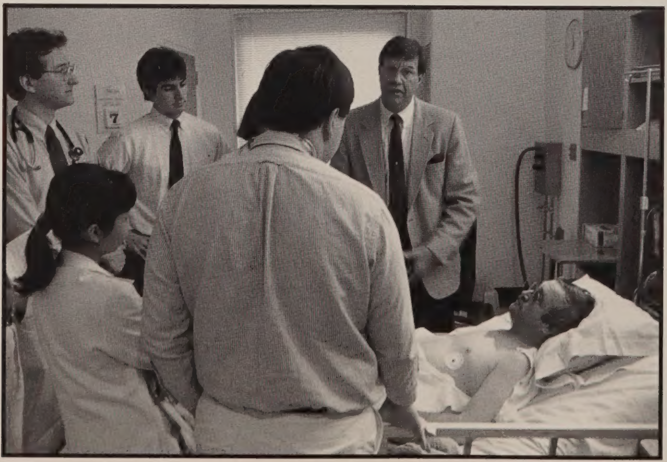
There are other factors, too. In choosing about 30 interns from among the roughly 1,000 who apply in internal medicine each year, for example, Dr. Bodnar says he and his colleagues "try to put together a group with an exciting mix of interests and backgrounds."

The MGH also seeks graduates suited to a setting in which residency can be made an extra challenge by two current factors: cutbacks in government funding and by patient care areas that, in some instances, are badly outmoded. Dr. Mankin, the Orthopaedics Chief, says it helps if applicants have experienced life at the MGH during their medical school careers. "We like to expose people to this environment in advance, and say, 'Now look, this can be a tough place. Do you really want to come here?'" he notes.

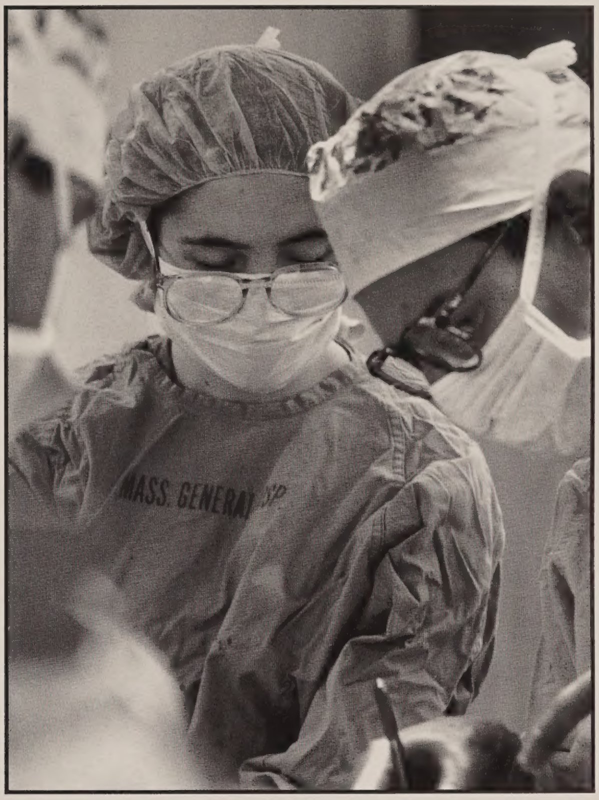
Many residents would doubtless agree that an MGH residency can be tough. Why is it, then, that the hospital routinely attracts a major share of the nation's top medical school graduates?

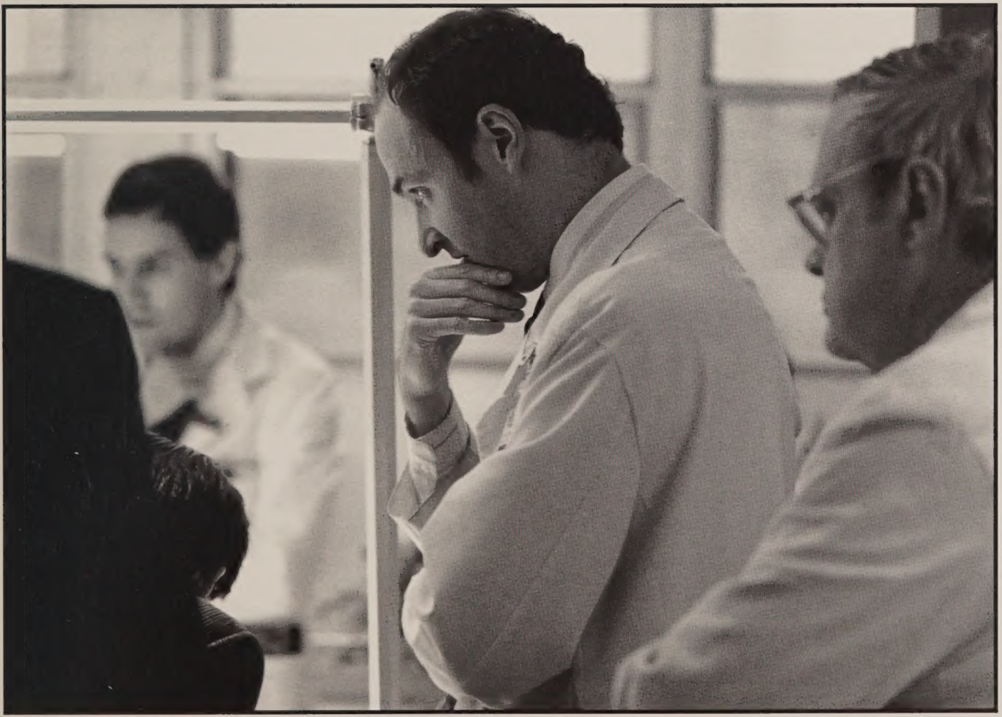
A major factor is the allure of working with senior physicians who in many cases—as one resident put it—have written the textbooks in their specialties. The MGH's senior staff members, moreover, are not only at the cutting edge of medical science but also have a wealth of bedside expertise to pass along.





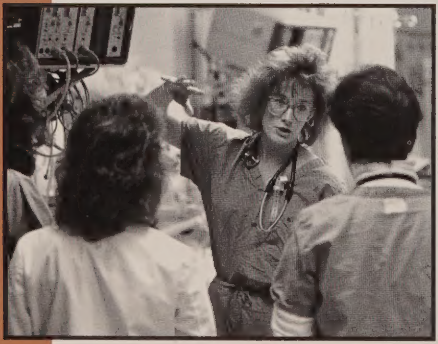
By working with outstanding senior colleagues and treating conditions rarely encountered anywhere but at leading referral centers like the MGH, residents acquire invaluable skills and a rare depth of medical insight. Dr. Russell, the MGH's head of transplantation, characterizes the abilities of these young physicians in this way: "Suppose you've traveled to an unfamiliar city and suddenly start to suffer severe abdominal pains, signalling a condition that calls for surgery. If one of our chief surgery residents walked through your door at that point, you could consider yourself very lucky."





Nurses

Keeping pace with advances in care



A decade ago, only intensive care nurses would have been caring for patients on breathing-assist devices. Today, the devices are employed in numerous units throughout the MGH.

That change, symbolic of the growing sophistication of the treatment offered by the MGH, means nurses today must know much more than they did even in the recent past. As Dr. Elizabeth Grady, R.N., Director of the Graduate Program in Nursing at the MGH Institute of Health Professions, notes, "You still need that strong back that people talk about, and a good heart, too. But you also need an intellect. Clinical wisdom is what distinguishes nursing practice."

As a major teaching hospital, the MGH has a prominent role to play in making sure that nurses have the knowledge they need to provide high-quality care in an era of sophisticated medicine. The hospital's most visible educational program for nurses is the patient care experience it provides for nursing students in various colleges. In addition, it supports the MGH Institute of Health Professions, whose offerings include an innovative master's program for nonnurse college graduates. The MGH is also a magnet for young nurses who have finished their schooling but are still eager to expand their skills.

In seeking out nurses for its own staff, the hospital is delighted that it attracts so many devoted to learning. But the MGH seeks more in prospective staff nurses than a thirst for increased knowledge, as important as it is, says Yvonne L. Munn, R.N., the hospital's Director of Nursing. "It is every bit as critical that we choose nurses with good interpersonal skills, concern for patients, and enthusiasm for patient care," says Mrs. Munn. The MGH is also interested in nurses who have already begun to specialize. Mrs. Munn adds, "If we have an opening in The Children's Service and the applicant has experience in that field, that's the match we want to support."

Learning opportunities for nurses, whatever their backgrounds, start the day they report for work. Every new nurse is assigned to a preceptor—a staff nurse who is prepared to help new colleagues learn what they need to know about the MGH and the relevant unit.

Preceptors and their assignees work together for periods of up to 12 weeks, often forging close bonds along the way. "The new nurses can communicate their reactions and frustrations freely, and feel quite safe about it," notes Dr. Harriet S. Chaney, R.N., the Director of Staff Development Services.

Even if the first weeks have the heaviest educational flavor, the learning process continues for each of the MGH's roughly 2,000 nurses year-in and year-out. There is a regular schedule of lectures and seminars, most aimed at helping the nurses keep pace with advances in patient care.

Many MGH nurses, with financial assistance from the hospital, also enhance their knowledge on their own. Twenty-eight earned bachelor's degrees last year, another 18 earned master's degrees, and many others progressed along one or another educational pathway. Much of the education of the MGH's nurses, though, doesn't happen in a classroom, but instead occurs in the course of their work with patients.

Consider, for example, the opportunity to learn from colleagues, a significant advantage in a sophisticated environment like the MGH's. "When a group of our nurses have worked together for awhile," says Mrs. Munn, "they develop respect for one another's knowledge, and they use that knowledge to enhance each individual's practice. That takes us a long way toward ensuring that the quality of care here is the best it can be."

The Institute

Redefining health-care education

The MGH Institute of Health Professions, founded in 1977, is a unique educational enterprise. Offering advanced master's programs in nursing, dietetics, and physical therapy, the IHP is the nation's only graduate degree institution created by a hospital.

"It's not just its degree-granting powers that set the Institute apart, though," says Patrick E. McCarthy, the IHP's President. "Its students are unique in that they are mid-career professionals or mature students seeking a new career. Their maturity and self-motivation allow the Institute to develop very rigorous programs. These students are well educated and approach their education with a single-mindedness that is inspiring."

The Institute's offerings are designed to fit the needs of such students. The Institute's professional programs are among the best in the country. In nursing, for instance, they are breaking new ground, preparing students to be leaders in their profession. One feature of all its programs is intensive exposure to patient care settings. Much of this occurs within the MGH, but the Institute also sends students to other settings that offer valuable clinical experience.

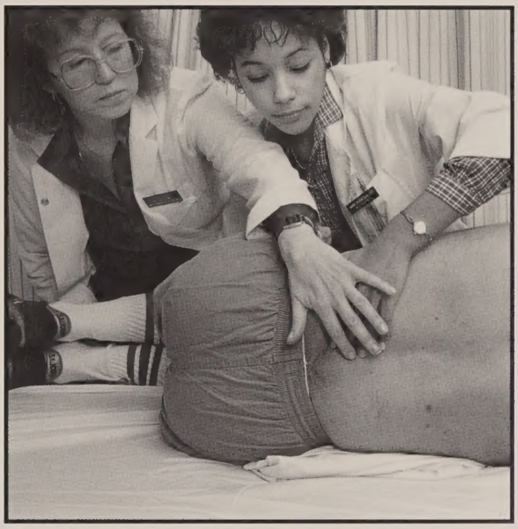
The Institute's programs require serious exposure to research, which means that most students learn at least the basics of research. Students interested in speech therapy, for example, may work in the Institute's sophisticated Neurolinguistics Laboratory, site of advanced research on speech disorders and other language-related problems.

Accompanying the need for skillful practice in a changing technology are the concerns for ethical considerations of health care. For this reason, the Institute has received and developed the Henry Knox Sherrill Chair in Ethics. This important resource provides courses in ethics for all the Institute's degree students and ethics programs for the hospital staff.

Most students specialize. Why? "It's largely a matter of advances in knowledge and techniques," says Alan Jette, Ph.D., P.T., an associate professor of physical therapy. "Research findings about the workings of the human body have put new demands on physical therapists dealing with any number of ailments, among them problems affecting the back.

"In the past, if a patient had a back problem, there was one set of exercises you were taught to do. That's not true now. You start by asking, 'What's the impairment that's causing the problem,' and then—if it's within your scope of practice—you design a program to address the underlying condition."

As Dr. Jette's observations imply, students at the IHP learn not only advanced skills and knowledge but also how to respond to the individual needs of each patient. Most IHP faculty would say of their students what Dr. Grady, the head of the Institute's graduate nursing program, says of its nurses: "Compared to nurses in the past, our graduates feel much freer to think through with the patient what's best for that patient."



Research

Nurturing the drive for answers

Though largely out of the public's view, there's a staggering amount of research under way at the MGH. Our researchers, many of them physician-scientists, are probing subjects from new drug therapies for cancer to the inner workings of cells.

The research budget has passed $80 million a year, and is growing rapidly. There's no doubt the research we're doing is yielding important medical advances. But does it influence, day-to-day, the quality of patient care and of in-hospital education?

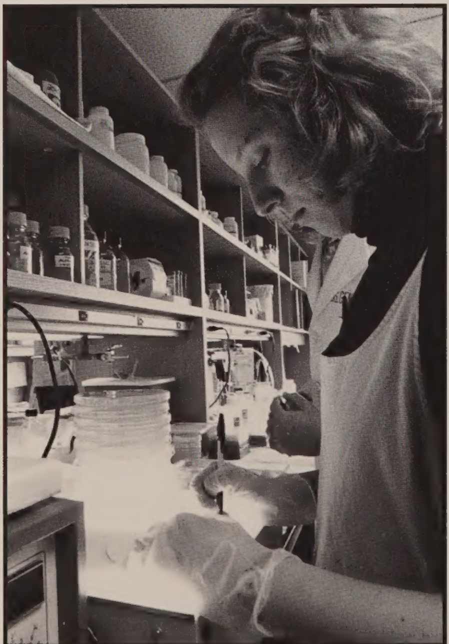
Ask that of Dr. Patricia K. Donahoe, and she'll tell you unequivocally that it does. The MGH's Chief of Pediatric Surgery, Dr. Donahoe (in photo at right) is in a superb position to judge. Besides being a leading children's surgeon, she heads a research laboratory whose achievements include isolating with Cambridge's Biogen Company the Mullerian inhibiting substance (MIS)—a protein that allows the development of male fetuses by inhibiting the growth of the structure that would otherwise evolve into the female reproductive tract.

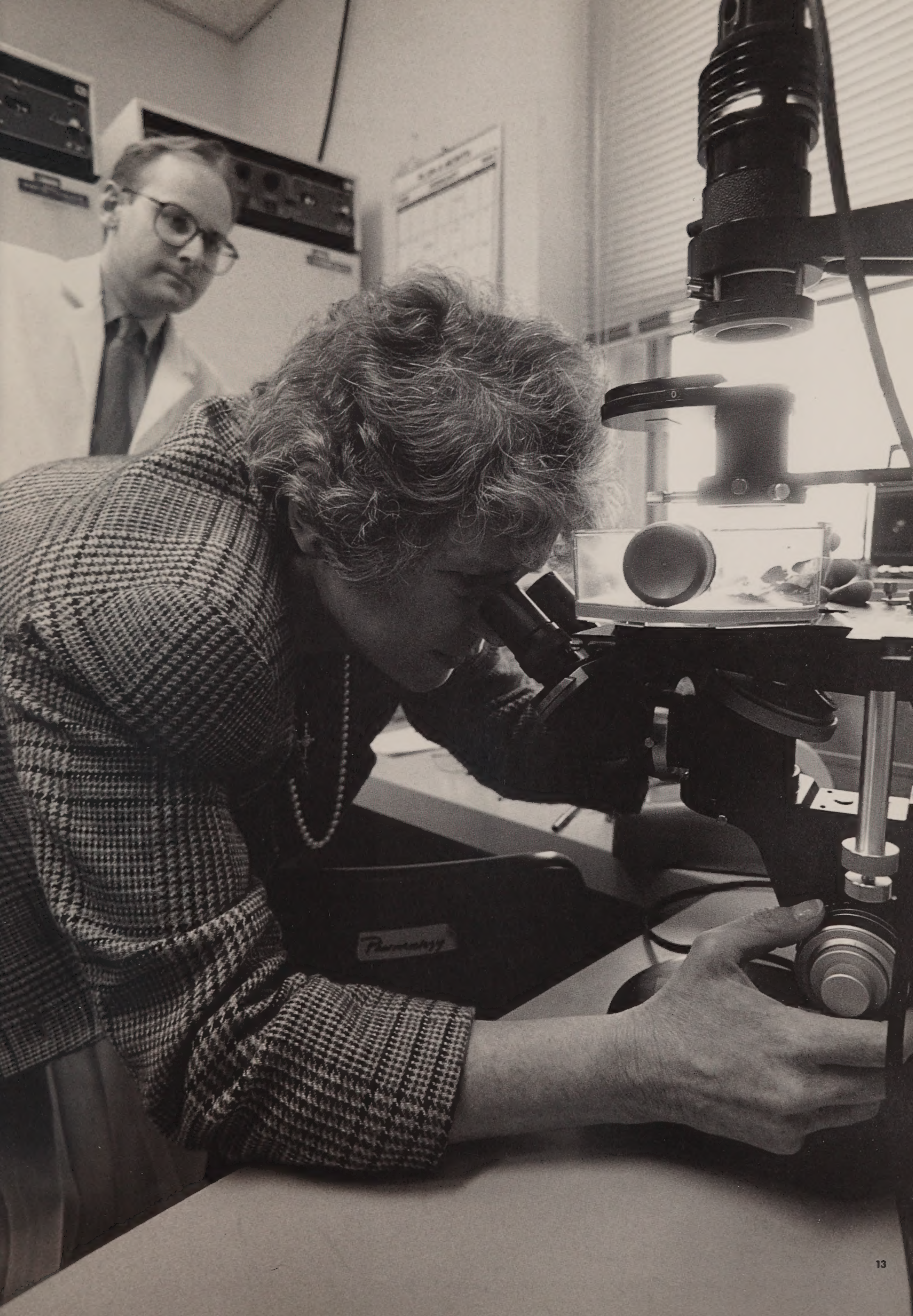
Dr. Donahoe's research is clearly linked with patient care. She and her associates have shown that MIS can reverse tumor growth, and they hope to see it adapted soon as a therapy for ovarian cancer. But she says the connections go well beyond potential new therapies.

She frequently treats babies whose reproductive organs haven't formed properly. In the course of her efforts to make such infants as close to biologically normal as medical science permits, Dr. Donahoe observes such abnormalities at firsthand—and through that, she says, "we get valuable leads to pursue in the lab."

The connection runs the other way, too, with important consequences for the young people who train under her. "The key to successful research," she says, "is persistence—a trait that carries over into treatment. Our people just never give up."

Another perspective is that of Dr. Francis Cigarroa, a surgical resident who spent two years as a research fellow in Dr. Donahoe's lab. "The experience," he says, "helped me realize why so many MGH physicians devote some of their time to research. A key benefit is that it helps you gain a deeper understanding of the problems you treat."




Pharmacology

Leadership

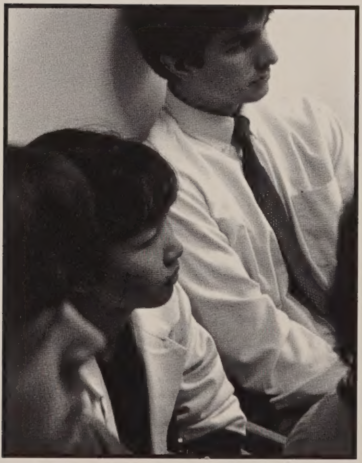
Safeguarding a cherished tradition

If the achievements of graduates are a good measure of success in education, the MGH has done exceptionally well.

Among former MGH residents, for example, are 450 medical school professors, more than 120 heads of medical school departments, and an estimated 200 chiefs of service at hospitals around the world. The institutions such graduates serve include Johns Hopkins Hospital, the New York Hospital–Cornell Medical Center, Michael Reese Hospital in Chicago, the American Hospital in Paris, and Harvard, Yale, Brown, Duke, and Stanford universities.

It's an impressive roster. And a survey of former MGH people in the other health professions who've risen to leadership positions in their fields would doubtless give us further reason for pride in our educational accomplishments.

It's unlikely many MGH staff members would see great value in dwelling on such achievements, though. The reason is that they are focused so intently on the task at hand, which Dr. Buchanan, the General Director, describes this way: "To take care of patients in a way that sets a standard for excellence, and that serves as a model for the education of young people in the caring professions."



Dr. Paul Dudley White, teacher

The Boston novelist Henry James once wrote that a teacher "affects eternity; he can never tell where his influence stops."

As applied to Dr. Paul Dudley White, the renowned MGH cardiologist, that observation is singularly apt. Though known for his patient care skills, Dr. White's most enduring contributions flowed from his role as a teacher.

It was a role with two different but related dimensions. One involved the public Dr. White, tireless advocate for the causes he espoused and consulting physician to President Eisenhower. The other was the private Dr. White, source of guidance and inspiration to generations of young physicians.

In his public role, the cardiologist's influence is felt every time someone chooses fish over steak, or goes for a jog or a bicycle ride through the park. Long before the effects of a fat-laden diet and other lifestyle factors on heart attack risks became widely understood, Dr. White was spreading word. "Use your arms and legs and lungs more," he advised in 1929, "and your stomach and automobile less."

In making his case to the public, Dr. White used every available avenue. He often wrote articles for popular magazines, was always ready to talk to reporters, and, recalls Dr. Allan L. Friedlich, an MGH cardiologist and longtime associate of Dr. White, "he never turned down an invitation to talk to school kids."

The famed cardiologist, who founded the MGH's Cardiology Unit and headed it for 34 years, was equally masterful in the other important facet of his teaching efforts: training young physicians.

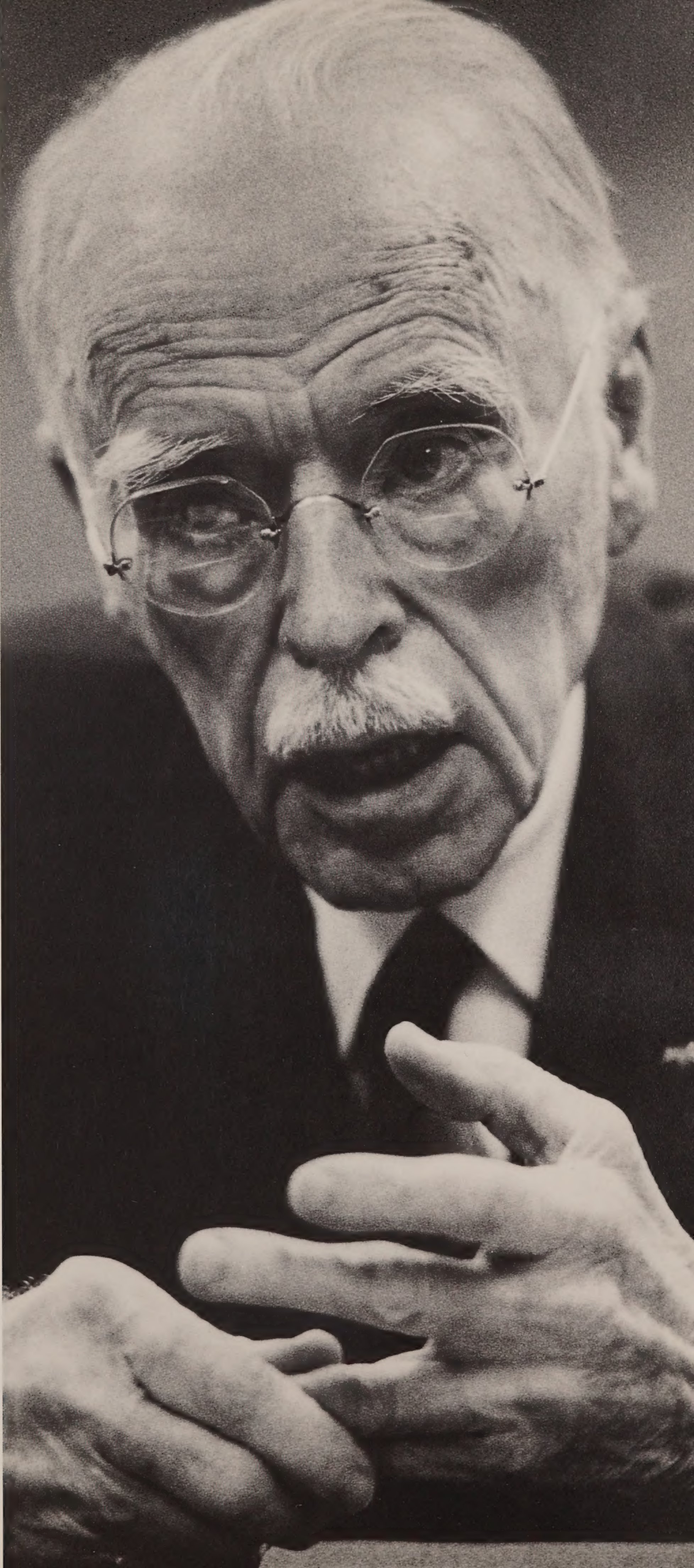
Dr. Friedlich says it was a privilege to watch Dr. White in his dealings with patients. "He had enormous respect and affection for people of every category," says Dr. Friedlich. "It was not unusual to see him kiss patients, men and women alike."

When teaching a group of house officers and medical students at a patient's bedside, Dr. White always faced and conversed with the patient.

Among the precepts Dr. White taught his young associates are some widely accepted in the treatment of heart attacks. One was to get the patients moving again as quickly as possible. Another was to tailor the post-heart attack regimen to the capabilities of the individual patient. A third was to encourage an optimistic outlook. "The old adage, 'While there is life there is hope,'" Dr. White said, "proves true often enough even in the sickest patients to justify its use without any overconfidence."

The cardiologist was not always an easy taskmaster, says Dr. Friedlich. Still, residents came from all over the world to work with him, and he clearly took pleasure from his interactions with them. "P.D. always had his ear to the ground for new, exciting ideas," recalls his former associate.

Dr. White died in 1973 at the age of 87. Though the scope of his influence can never be accurately measured, Dr. Friedlich says he witnesses one facet of it day-in and day-out at the MGH. "His attitude and practices in dealing with patients were so impressive," says Dr. Friedlich, "that three generations later, you can still recognize his traits in the house officers of the Massachusetts General Hospital."



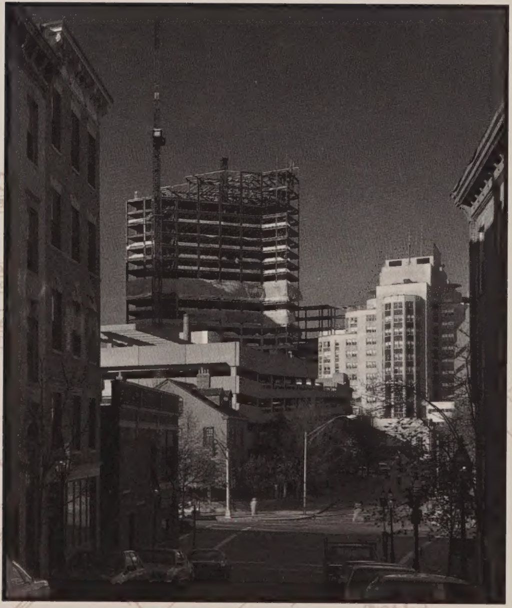
Tower Progress

The steel frame of the first of the MGH's two new inpatient buildings rose to become a prominent part of the hospital's profile, signalling that a long-time dream is not far from reality.

The new, 24-story structure will house roughly 400 patients. According to Lawrence E. Martin, the MGH's Associate General Director, the first units are to move into the building in the fall of 1989, and the whole building should be occupied by the spring of 1990.

The new building, to be followed by a second, 16-story one, will differ from other MGH buildings in more ways than its height. For one, it's the first MGH patient-care facility whose design reflects major input from users, including parents. Mr. Martin explained that a group of individuals whose children had spent time in intensive care at the MGH and elsewhere approached the hospital and asked to be included in the planning process. "We told them, 'Of course we'll work with you,'" the MGH executive added.

Partly because of the group's suggestions, the new neonatal and pediatric intensive care units will include not only sleeping areas for parents but also such amenities as washing machines—a convenience for parents who must rush their youngsters to the hospital without time to pack.



The new tower will offer many welcome features for patients as well. Meals will be heated on each floor, guaranteeing that they will arrive warm at the bedside. (This service will be provided in the MGH's other inpatient buildings, too.) All patients will have their own bathrooms and closets, and most will have arresting views: patient rooms in the glass-walled structure will have windows roughly eight feet wide by six feet tall.

The MGH has yet to raise all the funds it needs to build the towers. Its capital campaign, with a goal of $169 million—much of which will go to the new inpatient facilities—had generated $147 million as this publication goes to press. The campaign continues through the end of 1989.

Saving newborns

Using an innovative technique, physicians at the MGH saved the life of newborn Christopher Riley, of Waltham, Mass., and they expect to save more young lives the same way.

Last summer, the youngster was brought to the hospital suffering from severe aspiration pneumonia in his lungs. Drs. Daniel Ryan and John H. Fugate put the child on a device called an extracorporeal membrane oxygenator (ECMO). The oxygenator in effect takes over for the patient's lungs, giving them time to heal. After five days, the baby was well enough to be put on a standard respirator, and three days later his parents took him home.

The ECMO technology was originally tried in adults, but adults proved to have irreversible lung disease that did not heal while on ECMO. Neonates have reversible lung disease that can heal if given rest.

The MGH is one of two hospitals in New England with a pediatric ECMO system.

Changeover at Logan

The MGH has turned over operation of its Logan Airport clinic to the East Boston Neighborhood Health Center.

The hospital had run the clinic since 1963. The decision to seek new management for it was made reluctantly, said Dr. Roger H. Sweet, director of the MGH-Community Health Associates. However, he said that "fiscal constraints have forced us to divert our resources to programs that are growing at our other community health centers and at our main campus."

Dr. Sweet said the East Boston organization has an excellent record and that Logan's employees, as well as passengers needing emergency treatment, can be assured of continued high quality care. The group took over in January 1988.

Huntington's disease study

MGH physicians reported that some individuals at risk for Huntington's disease, a fatal, inherited ailment of the nervous system, were at least initially reluctant to find out if they are fated to contract the disease.

A group headed by Dr. Gregory J. Meissen, formerly a visiting scientist in the MGH Neurology Service, reported on an offer of free genetic testing to potential Huntington's sufferers. Only 47 individuals came forward, fewer than expected, and 18 later withdrew. The hospital received roughly 250 preliminary inquiries about the test.

Among the four individuals in the initial group who tested positive, the news triggered depression and some changes in life plans. Seven individuals tested negative. In other cases, the results were inconclusive.

The MGH breakthrough which led to the test came in 1983. The hospital was one of the first two in the nation to offer testing for it. The same MGH team, led by Dr. James F. Gusella, is continuing its search for the gene defect.

3 Million and counting

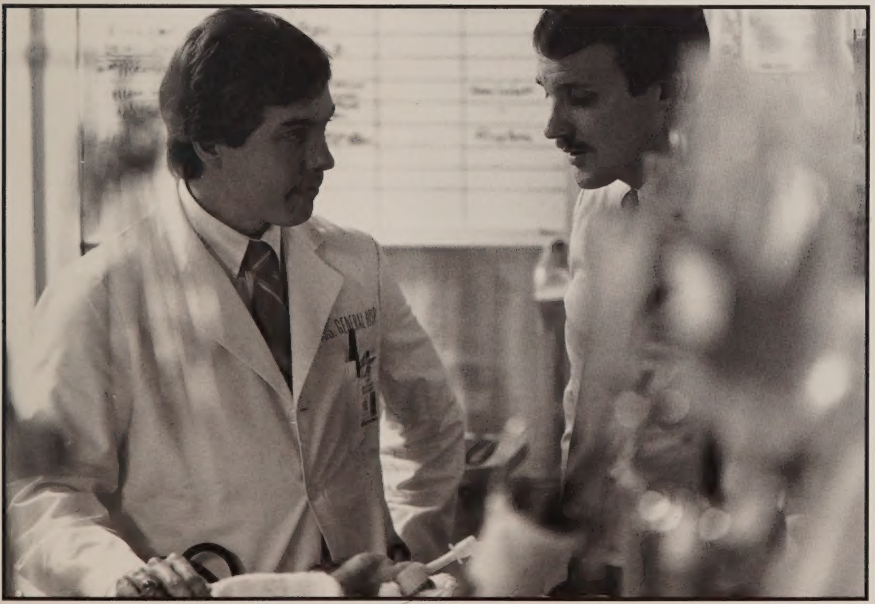
Frances Vandermark, 75, a Gloucester resident, made history at the MGH.

When she checked in June 2, 1988, Mrs. Vandermark became the three millionth new patient to seek care at the hospital. The patient, admitted for a minor cardiac procedure, was presented with an MGH T-shirt and a begonia in honor of the occasion.

The hospital opened September 21, 1821. Its first patient was a saddlemaker, and over the first 20 days of his treatment—for syphilis—he was also the new institution's only patient.

The pace of admissions has picked up sharply since. The hospital treated its 500,000th new patient in the late 1930s, and the remaining 2.5 million outpatients and inpatients in the roughly 50 years between then and Mrs. Vandermark's admission.

Frances Vandermark



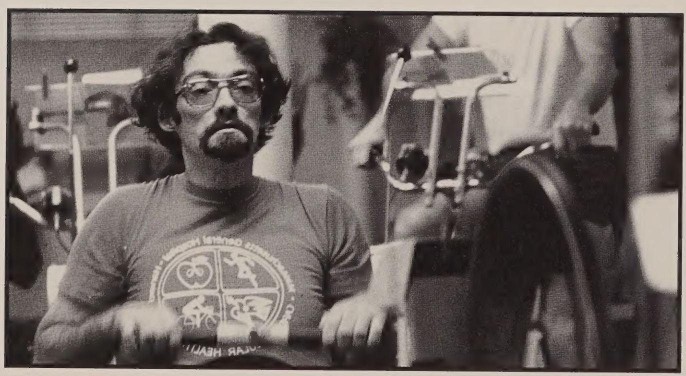
Drs. Daniel Ryan (left) and John H. Fugate

Transplantation milestone

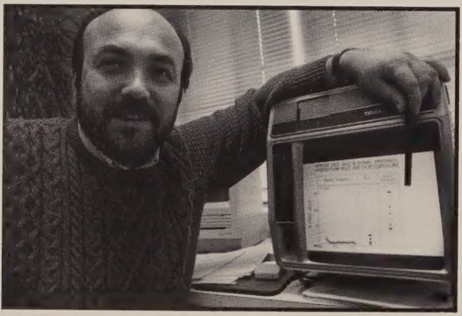
A Malden man who was among the first to be cured of a usually fatal blood disease by means of a bone marrow transplantation underwent a successful liver transplant.

Jeffrey Donnelly, 32, was given a bone marrow transplant in 1973 for aplastic anemia, an ailment in which the marrow stops making blood cells. The transplant cured him of the anemia, thus saving his life, but he later contracted hepatitis, probably as a result of blood transfusions.

Fifteen years later, his liver had severely deteriorated. In July, a team led by Dr. A. Benedict Cosimi replaced Mr. Donnelly's damaged liver, making him perhaps the first person in the world to have undergone both successful bone marrow and liver transplants.



Jeffrey Donnelly working out on a rowing machine



Dr. Mehmet Ozturk

"Spider vein" therapy

MGH dermatologists reported that an innovative kind of laser adapted for medical use by researchers at the hospital works well in treating the reddish-purple blemishes called "spider veins."

Spider veins are dilated blood vessels, and show up as irregular lines on the skin of millions of fair skinned Americans. The veins are particularly annoying when on the face or legs.

Dr. Ernesto Gonzalez and his associates used what is called a tunable dye laser to treat an initial group of 92 patients with spider veins of the face. In a presentation last June, Dr. Gonzalez said the laser cleared up the blemishes with no scarring—a problem in other forms of laser treatment—and minimal pain.

The tunable dye laser was used because of its selectivity since the energy is strongly absorbed by the enlarged vessels but leaves other tissues relatively untouched.

New tests for cancer

MGH Cancer Center researchers, working with other Boston colleagues and scientists from France, developed tests for a form of cancer that strikes women of child-bearing age.

One test allows highly accurate measurements of a hormone secreted during pregnancy. Since the hormone's levels are high in women suffering from a cancer called choriocarcinoma, the new test allows physicians to distinguish individuals with the cancer from those who are having a normal pregnancy, or who harbor a benign tumor.

The second test, like the first, makes use of very specific proteins called monoclonal antibodies. It allows early detection of tumors that recur in a patient who has been afflicted by choriocarcinoma. Dr. Mehmet Ozturk says the test will let physicians start chemotherapy sooner than has been possible up to now, "greatly increasing the patient's chances of a full recovery."

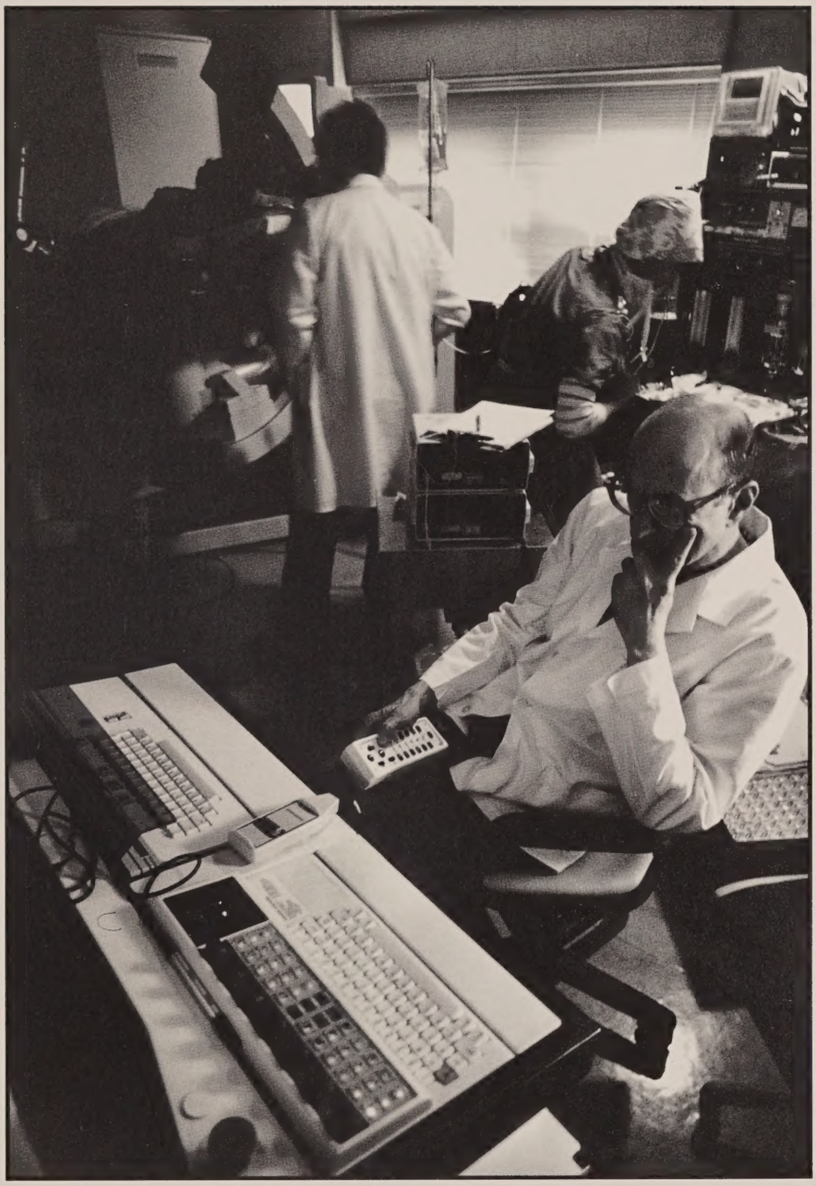
Institutions involved in the study with MGH investigators were the Brigham and Women's Hospital in Boston and the Institute Gustave Roussy in Paris.

Gallstone lithotripsy

For the first time in New England, patients were treated for gallstones with a device that shatters the stones without the need for surgery.

The MGH, in a joint venture with the New England Medical Center, bought a lithotripter designed to treat gallstones. In 1984, the MGH had been one of the first to start using a different version of the device to treat kidney stones. The instruments, made in Germany, work by beaming an intense sound wave at the stones through the skin.

There are about 440,000 gallstone operations in the U.S. each year. Dr. Ronald A. Malt, the MGH supervisor of the new gallstone lithotripsy clinical trial, which began in September, said the new approach will reduce the need for gallstone surgery.



Dr. Ronald A. Malt at controls of lithotripter

Clues to infant deaths

A visiting astrophysicist and other MGH researchers found a potentially important clue to the cause of sudden infant death syndrome (SIDS).

Using sophisticated computer techniques employed in space studies, Dror Sadeh, Ph.D., Coordinator of the Israeli Space Agency, and MGH pediatricians analyzed recordings of the heartbeats of roughly 7,000 babies. Of the ten infants who had died suddenly, half showed evidence of an abnormal relationship between the contraction and relaxation phases of the heartbeat, suggesting that a problem with the nerves serving the heart was to blame for their deaths.

Testing the brain at 15,000 feet and higher

An Army research and medical team, led by an MGH neurosurgical resident, Dr. Allan J. Hamilton, set up a research station high up on North America's highest peak to study how well the human brain adjusts to the lower amounts of oxygen at high altitudes.

The eight member team employed three huge Army helicopters to drop off more than 20,000 pounds of equipment and establish a scientific research and medical base three quarters of the way up the 20,320 foot Mt. McKinley in Alaska. The team remained on the mountain for nearly four weeks in subzero weather, testing more than 200 climbers, carrying out 7 rescue missions (including the highest helicopter rescue in North America), treating more than 30 frostbite victims, and still finding time to put a team of its own atop North America's highest summit.

Two instruments the team tested were developed by the U.S. Army. One determined whether a computer could pick up subtle changes in hand-eye coordination at high altitude. The second device used a large stainless steel platform to detect minute changes in equilibrium which were then analyzed by computer.

Test site on Mt. McKinley

Promise in lasers

In recent years, MGH scientists have done much to help give the laser a growing role in medical treatment.

Their most recent contribution was showing that certain types of lasers work well against the blemishes called "spider veins." (See news item on Page 18.) Previously, the scientists adapted lasers for uses against conditions ranging from port-wine stains, another form of skin blemish, to kidney stones.

A leading figure in these advances, Dr. John A. Parrish, was named head of the MGH Dermatology Department a year ago July. Dr. Parrish also heads the Wellman Laboratories of Photomedicine, site of the research that set the stage for the advances to date.

Among Dr. Parrish's goals is to adapt lasers for use in treating clogged arteries, and in attacking cancers that arise in internal organs.

Identifying individuals prone to a cancer-causing ailment

MGH investigators found a genetic "marker" that may help pinpoint individuals predisposed to a disease that causes multiple cancers.

Von Hippel Lindau (VHL) is a devastating hereditary disorder associated with various forms of cancer in multiple organ systems, frequently leading to death. The most common tumors in VHL are kidney cancer and certain types of brain tumors. By pinpointing a genetic abnormality in VHL patients, Dr. Bernd R. Seizinger and his associates have opened the way for tests that can identify such individuals at a young age. This, in turn, will permit careful monitoring of those affected for signs of emerging tumors.

Dr. Bernd R. Seizinger

The same gene defect that causes VHL may also be responsible for sporadic kidney cancers (in patients without VHL) which account for approximately 10,000 deaths in the U.S. per year. This new finding in March 1988 may therefore prove broadly useful in the attack on cancer with important implications not only for VHL patients but also for a considerably larger number of cancer patients in the general population.

Kidney studies

As the result of two major research grants, the MGH became more heavily involved than ever in the struggle against kidney disease.

A five-year, $4.2 million federal grant to the MGH Renal Unit will allow intensified studies of how the kidney works. One of the goals of the Unit, headed by Dr. Dennis A. Ausiello, is to explore a disease that disrupts the kidney's operations. Called glomerular nephritis, it occurs when the body inappropriately attacks proteins involved in the normal workings of the kidney.

Through another federal grant, this one for $5 million, investigators in the Renal Unit are joining colleagues from elsewhere within the MGH and from other Boston teaching hospitals in a major study of the links between diabetes and kidney disease. Roughly a third of the cases of fatal kidney disease in the U.S. result from diabetes.

The grants were announced in the fall of 1987.

Imaging organs

MGH researchers reported that a new magnetic resonance imaging (MRI) device shows early promise for pinpointing conditions of the heart and liver.

The new device, called Instascan, has an electromagnet twice as powerful as those of conventional instruments, enabling it to obtain images in a fraction of a second. Conventional systems take several minutes per image.

Dr. Elizabeth A. Drucker said the new system is fast enough to obtain clear images of the heart at targeted intervals. Its speed, she said, means it can "overcome the loss of clarity caused by heartbeats and breathing."

The images' clarity may also aid in diagnosing liver problems. Dr. David D. Stark said the Instascan might allow physicians to distinguish cysts or benign growths from malignancies. He and Dr. Drucker reported the results of their preliminary tests in November 1987.

AIDS and the retina

MGH investigators reported finding the AIDS virus in the retina, the lining at the back of the eye where light signals are received.

The finding may help explain why AIDS patients often suffer eye problems, said Roger J. Pomerantz, M.D., the study's lead investigator. The virus itself may cause the retinal problems, he said, but it may set the stage for infections by other viruses.

The finding was reported in the *New England Journal of Medicine* in December 1987.

Navy Yard milestone

The MGH Cancer Center opened its massive new laboratories in the Charlestown Navy Yard, and the hospital's Renal Unit began creating a research facility at the same location.

The hospital also received state permission to set up magnetic resonance imaging (MRI) facilities at its Charlestown location. The imaging equipment, which works by measuring the tiny signals emitted by atoms in the body, will be used for both patient care and research.

Much of the Cancer Center's research arm, which is occupying 56,000 square feet in the former naval plant renovated for the MGH, opened its new laboratories in August. Dr. Kurt J. Isselbacher heads the Center and is recruiting outstanding researchers who use state of the art technology in their war against cancer.

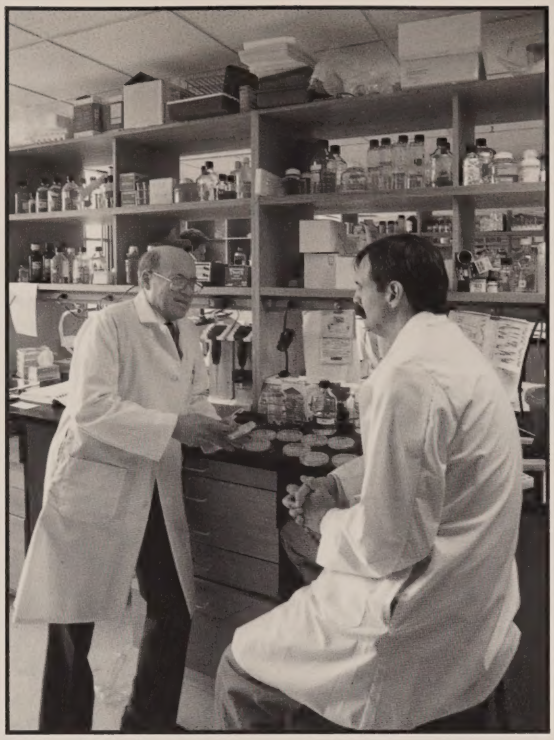
Dyslexia center

The MGH Institute of Health Professions joined a renowned school for young people with reading and writing difficulties in establishing a dyslexia research center.

The new Center for Research on Reading and Writing Disorders is a joint venture of the Landmark School and the MGH Institute's Neurolinguistics Laboratory and is situated in Manchester, Mass., at one of Landmark's four campuses.

The center's organizers hope to shed new light on dyslexia, a condition that makes difficult the decoding of letters into sounds and word meaning. A key goal is to pinpoint the genetic and neurological aspects of the condition, which tends to run in families.

Dr. John Locke, Director of the Neurolinguistics Laboratory, heads the new center. Dr. Charles Drake, founder of the Landmark School, is the Center's Associate Director.



Dr. Kurt J. Isselbacher (left) in new facility

mistak

Honors for an achiever

The months before and after his "official" retirement were both busy and honor-laden for Dr. Thomas B. Fitzpatrick, former Chief of Dermatology at the MGH.

A chair has been created in his honor at Harvard Medical School (the Thomas B. Fitzpatrick Professorship of Dermatology) where he had headed the Dermatology Department for 29 years. The University of Massachusetts gave him an honorary degree at the 1987 convocation of its medical school. That same year, Japan awarded him the Order of the Rising Sun.

But Dr. Fitzpatrick, whose contributions include a major role in developing an effective therapy for psoriasis, hasn't been resting on his laurels since stepping down as chief in June 1987. Among other things, he's working on a new book—his twelfth.

AIDS researcher cited

Dr. Bruce D. Walker, an assistant in medicine at the MGH, was chosen as the Burroughs Wellcome Investigator in Virology of the Infectious Diseases Society of the United States.

Dr. Walker and his associates have found a group of white cells called killer T cells that specifically target the AIDS virus. The finding could help speed the search for an AIDS vaccine.

The Burroughs Wellcome Foundation supports the award, which is accompanied by $90,000 in research funds. The foundation is affiliated with the Burroughs Wellcome Co., a pharmaceutical firm headquartered in North Carolina.

The award, which is targeted to young researchers, was announced in February 1988.

In memoriam

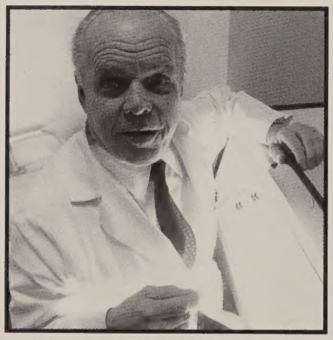
Dr. Thomas Paul Hackett, Jr., Chief of Psychiatry, died in January 1988 at the age of 59.

A native of Cincinnati, Dr. Hackett moved through the education system at a remarkable rate, becoming an Instructor in Physiology at the University of Cincinnati when he was 13 years old.

Dr. Hackett was named Chief of Psychiatry in 1976. Under his direction, the MGH Psychiatry Service grew in both size and stature. He also headed the hospital's Psychiatric Consultation Service, which treats the mental problems of patients admitted for medical reasons.

Known for his energy, his knowledge of many fields, including botany and herpetology (the study of snakes), and his sense of humor, Dr. Hackett will be sorely missed.

Dr. Edwin Cassem has been named Acting Chief of the service.



Dr. Thomas B. Fitzpatrick

Dr. Bruce D. Walker

Heading Emergency Services

Dr. Alasdair K. T. Conn was named the MGH's new Chief of Emergency Services.

Formerly Chief of Trauma for Boston's University Hospital, Dr. Conn will continue as the Executive and Medical Director for Boston Med Flight, the helicopter emergency service sponsored by the MGH and other area hospitals.

The new chief replaces Dr. Earle Wilkins, who retired from the Emergency Services post after 18 years.

A native of England, Dr. Conn received his medical education at the University of Edinburgh, Scotland. He was named Chief of Emergency Services in April 1988. He has also been appointed an Assistant Professor of Medicine at Harvard Medical School.

New Chief of Radiology

Dr. James H. Thrall, formerly head of the Department of Radiology at the Henry Ford Hospital in Detroit, became Radiologist-in-Chief at the MGH.

Dr. Thrall replaced Dr. Juan Taveras. In his new position, Dr. Thrall will be involved in both patient care and research. Even prior to his February 1, 1988 appointment, he was collaborating with MGH physicians on a study of imaging in the diagnosis of blood clots.

A University of Michigan Medical School graduate, Dr. Thrall says one of his priorities will be to shorten the timetable for imaging appointments.

A glittering record

When Dr. Juan M. Taveras stepped down as the MGH's Radiologist-in-Chief in February 1988, he could look back on a remarkable record of achievement. During the 16 years he headed the Department of Radiology, it grew into one of the largest and most respected departments of its kind in the world.

Dr. Taveras oversaw the MGH's pioneering efforts involving such technologies as computed tomography (CT) scans and magnetic resonance imaging. He also led efforts to encourage the training of subspecialties. A radiologist with intimate knowledge of a specific organ system, he said, "can work closely with the clinical specialists who are involved with the same system, creating the team approach that leads to improved patient care."

Dr. Taveras, also formerly Chairman of the Harvard Medical School Department of Radiology, will remain on the Harvard faculty.

Gynecology expansion

Dr. Isaac Schiff, incoming Chief of Staff for Vincent Memorial Hospital, the MGH's Gynecology Division, announced plans to increase services to women.

Dr. Schiff, who succeeded Dr. George S. Richardson, Acting Director, on April 1, 1988, said more physicians and other staff would be added in gynecology, shortening the wait for appointments. He also announced the creation of two new units, one focused on infertility and the other on problems associated with menopause.

Dr. Schiff, a member of the staff of Brigham and Women's Hospital before joining the MGH, is an expert on menopause. He and his collaborators have shown that treatment with estrogen, the reproductive hormone whose output falls in menopausal women, can alleviate the insomnia many women experience at this point in their lives.

The new Chief of Gynecology is a graduate of McGill University School of Medicine in Montreal. In addition to his MGH appointment, he has been named the Joe Vincent Meigs Professor of Gynecology at Harvard Medical School.

Chairman's Report

YOU HAVE READ in this report that the Massachusetts General Hospital continues to perform as an international leader in patient care, teaching, and research. What is less evident is the fact that these achievements are being threatened by a growing crisis in financing of health services.

In Massachusetts, the highly regulated system governing the reimbursement of health services fails to cover costs that have been most recently inflated by the necessity of paying nurses and other care givers competitive wages and by the technology that helps bring improved health. Federal payments for medical care also fall short to the point where now the hospital spends more to care for the average Medicare patient than the amount Medicare pays.

The increasing gap between what government is willing to pay and the cost of delivering hospital services has resulted in an operating deficit for the hospital in FY 1988 and a budgeted deficit for the current fiscal year. These deficits occur in spite of five years of aggressive and effective programs to contain operating expenses. Of greatest concern is that these deficits occur when demand for care has never been higher. The MGH this year frequently operated at capacity, and our staff responded by increasing their workload, often with fewer resources.

As of this writing, the situation has worsened. The Commonwealth, facing its own budget crisis, is unable to pay funds appropriated to offset Medicare losses and for past services to Medicaid patients. It has also held back its contribution to a pool of funds designed to compensate hospitals for the care given to people who are ineligible for Medicaid and too poor to have private insurance.

By the time you read this publication, these specific financing difficulties might be ameliorated, but they are symptomatic of a more fundamental concern: the social contract between hospitals and government, and to a lesser extent the public, has broken down. It is imperative for the well-being of all of us that the contract be restored. The public dialogue about health care delivery has deteriorated to the point where people ask: "Who owes what to whom?" High costs rather than quality of care dominate the debate.

At times, the public discourse loses sight of why voluntary hospitals, like this one, were created. People need a place to go for help at their most vulnerable moments. We use these institutions and their care givers when we are in pain, when we are worried, and when we can no longer function in our everyday lives. We come knowing that everything that is appropriate to do will be done. We often experience heroic action and dedication.

Our society is blessed by a decade of unprecedented new understanding of the complexities of our bodies and disease. The yield of our newfound knowledge is an equal explosion in complex technology and therapies. Caring for very sick people is no longer simple. It is complex, requires lots of highly skilled labor, and is by its very nature expensive. Is it worth it?

To measure the benefits of hospital care quantitatively is difficult, but methods are rapidly developing that will give us solid measurements. Telling, unscientific evidence lies in the enormous gratitude for the care received which is expressed by patients through their loyal support of this hospital. The *most* telling evidence is our own personal experience in receiving care at the MGH.

When one stands back from the noise of the debate on costs and reflects on this and other institutions, one sees clearly an enormously beneficial societal resource. It is self-evident to those who receive care and to those of us who volunteer our services to the hospital.

To those who challenge whether we or others are operating as efficiently as possible, I can only respond for the MGH. We have aggressively pared our expenses to the extent possible. There is no more to be trimmed without damaging the integrity of the hospital's ability to meet its obligation to its patients and society. And already we are starting to nibble at the amenities.

The demand for what the MGH does for society will not lessen. Those with illnesses such as heart disease, cancer, and the infirmities of aging will continue to come to us. Patients who have been unable to find help or even a clear diagnosis elsewhere will seek care here. The agenda of the MGH is and will be to serve these people through care, research, and educating the next generation of professionals and doing all these well.

We hold an optimistic picture for improving human health when one includes within it the talent and dedication of our staff, our nearly renewed facilities for patient care, expanded laboratories, remarkable therapeutic advances, and a tradition of innovation and excellence that spans 177 years. The MGH pioneered in community outreach and home care and continues to lead in extending health care into the community. The MGH also leads in advancing ethics in medicine and setting standards of care at a time when a worried public confronts physicians and hospitals.

The public dialogue needs a new framework that once again recognizes the quintessence of our great teaching hospitals, that is characterized by honesty not hyperbole, and that creates a climate where a new order of health delivery and financing can be created. It can happen none too soon, for the present course will damage these precious societal resources in a way that will take decades to repair.

In closing, I would like to thank the volunteers, staff, and friends of this hospital for their dedication and support through these difficult times.

W. Nicholas Thorndike

General Director's Report

One often hears that teaching hospitals provide the best care because they combine bright, challenging, young minds with the most up-to-date learning, and the experience of renowned physicians. That very amalgam also produces tomorrow's caretakers who journey from these very special institutions to both community and teaching hospitals, literally around the globe. Although less visible, the allied health professionals fulfill a crucial mission. They are the spine of every hospital, and in a teaching hospital require a level of education and training that permits them to feel totally at home among the latest, most sophisticated technologies while making the patients themselves as comfortable as their circumstances permit.

Over the years I have been privileged to survey many teaching institutions in one capacity or another. Far and wide the MGH has an elitist reputation. For that reason I expected when I came here some six and one-half years ago to find these halls populated almost exclusively with Harvard Medical School graduates and other Ivy Leaguers and leavened by a sprinkling from Stanford, Duke, Hopkins, and a few other leading medical schools. In spite of its reputation the MGH seems to be more willing than the others to accept into the training programs—and indeed into the professional staff—people with other than Ivy League credentials so long as they are individuals whose performance has demonstrated that they merit appointment at the General. For this reason I think the MGH is much less "pedigree" conscious and much more a meritocracy. I do believe this is an institution that puts an extraordinary value on achieving. It doesn't matter who is achieving, and it doesn't matter so much what field of medicine it is. However, if the performance is of high level and serves the patient care, teaching, and research purposes of this community, this institution values and rewards it.

To those who come here to learn, the MGH has a lot to provide. In addition to a variety of more typical opportunities, we have an MGH Institute of Health Professions that we believe is unique in this kind of setting. It offers graduate degrees in three separate fields, none an MD. In any hospital, physicians receive the most public attention. Without the other professionals, however, no hospital could function. In the MGH Institute we confer master's degrees on nurses, physical therapists, and dietitians, three of the several non-physician professionals who are so vital. The Institute graduates professionals whom it fully expects to be among the health care leaders of tomorrow. Under the leadership of its new President, Patrick McCarthy, the Institute has an opportunity to interface with the MGH in a manner that will enhance both institutions.

As for the MGH, its role in teaching remains what it has always been. Our primary mission really is to take care of patients in a way that sets a standard for excellence and that can be used as a model for the education of young people coming along in the caring professions and the support staffs that current programs require.

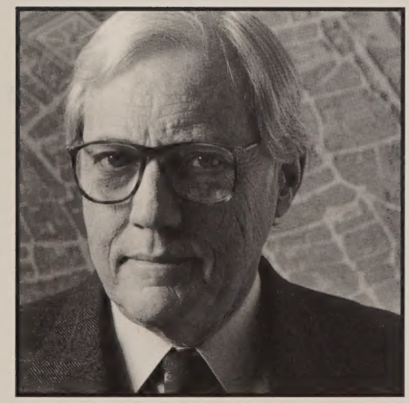
While our goal remains steadfast, the caring process has become so much more complicated and complex than it used to be that we have many more kinds of personnel to train and educate, and we have much more complicated concepts and technical processes to convey and supervise to be sure that the performance of the novitiates is up to the high standard we think is acceptable for the MGH. At the same time we are less independent because there are so many standard-setting agencies and oversight agencies to which we are accountable. Despite these many external agencies, and sometimes because of them, we have maintained our ability to sift through the complexities and maintain and improve our patient care.

At the same time I am very concerned about the rate at which teaching hospitals are being buffeted by external forces demanding changes that are not always consistent or even positive. Our way at the MGH has been to titrate the appropriate changes. Not what is just politically smart and feasible and will lead to possibly momentary gain. I think the externally driven necessity to change faster than at times the governance of the institution can comfortably process is a very risky business.

We need to make changes with the deliberation generated by the collective desire to preserve what is best in teaching hospitals and improve what needs improvement. Teaching hospitals are absolutely necessary in their many social roles whether it is in providing a model level of quality of service, an accessible service, an educational service, or an investigative or exploratory service. I haven't seen anything yet in health care that offers as much to society. Because its services are widely valued, the teaching hospital as we know it is not going to disappear. That does not mean we are not going to have a struggle. We will have a tough struggle—one that may leave at least some institutions with disfiguring scars. It is our obligation to make these changes which will keep us viable in the short run but will most benefit society in the long run.

Robert Buchanan.

J. Robert Buchanan, M.D.



The General Hospital Corporation

Excerpts from audited financial statements (in thousands of dollars)

Income	1988*	1987
From patient care	$409,165	$373,346
Less contractual allowance	51,676	41,527
	357,489	331,819
Research and other specific purposes	102,423	86,412
Other	19,160	17,310
Total Operating Revenue	479,072	435,541

Expenditures

For operating expenses: Salaries and related compensation	$242,588	$213,840
Supplies, expenses, depreciation	161,383	149,447
	403,971	363,287
Research and other specific expenses	80,051	71,286
	484,022	434,573
Surplus (Loss) from operations	– 4,950	968
Other income	3,066	2,116
Surplus (Loss)	– 1,884	3,084

*Year ending September 30, 1988

The Hospital's Dollar

Diagnostic and Therapeutic Services: *Diagnostic services, therapeutic services, house staff*	50.6%
Nursing Care	17.7%
Plant and Equipment: *Depreciation, interest, energy, telephone, maintenance*	10.9%
Room and Board Services: *Food, laundry, security, housekeeping*	7.7%
Administrative Services: *Computer, accounting, administrative services, etc.*	13.1%

Massachusetts General Hospital

Facts and Figures

October 1, 1987– September 30, 1988	
Beds	1,081
Number of Admissions	33,260
Number of Ambulatory Visits	491,714
Inpatient Surgery	18,258
Emergency Ward Visits	67,000
Day Surgery	8,303
Active Staff	1,640
Clinical Fellows	270
Residents	416
Research Fellows	327
RNs	1,200
LPNs	66
Nursing Assistants	58
Volunteers	1,005
Employees	9,500

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Ways of Giving

Not long after its founding in 1811, a public campaign was launched to raise funds for the first building of the MGH. Citizens from all walks of life made contributions, ranging from 25 cents to $15,000.

One hundred seventy-seven years later, the MGH continues to rely heavily on voluntary contributions to ensure the hospital's world-wide leadership in patient care, medical education and research. Again the greatest need is for buildings. A twenty-four story tower is rising above the MGH campus to replace the most antiquated inpatient buildings. This modern, efficient facility is financed in part by the current Capital Campaign. The Campaign to Rebuild the MGH is now in its final year. Over $16 million in gifts and pledges was raised during FY 1988, bringing the campaign total to $137,907,449 at the end of the fiscal year. (As of the end of February, 1989, the Campaign stands at $147,200,000.) The goal is to achieve a total of $169 million by December 31, 1989.

Today there are many ways of giving made possible by federal laws enacted to encourage charitable contributions. The simplest way for you to support the hospital is with a gift of cash, which earns an income tax deduction if you itemize your deductions.

Gifts of appreciated securities also offer tax advantages. In addition to gaining you a tax deduction of their full fair market value, they enable you to avoid capital gains taxation on the appreciated portion.

Other assets that may be used to make an outright gift include real estate, personal property, life insurance, and business interests. Many business firms have matching gift programs that double or even triple the value of a gift to the MGH.

If you want to make a substantial gift to the MGH but need to retain your sources of income for yourself or other family members, you may want to consider a life income gift. The most popular means of making a life income gift are the MGH Pooled Income Funds and Charitable Gift Annuities. Your gift to a Pooled Income Fund is combined with the gifts of others for investment purposes. You receive expert investment management at no cost to you. The lifetime income varies according to the earnings of the Fund. The principal comes to the MGH only after the last beneficiary has died. When you make the gift, you receive a tax deduction based on the future value of the gift to the hospital.

For those who prefer the security of a fixed income, a Charitable Gift Annuity provides a guaranteed lifetime income, a portion of which may be tax-free. Other life income plans can be individually tailored to your needs.

Bequests have been the largest source of funds for building the MGH over the years. Providing for the MGH in your will allows you to reduce the amount of taxes your estate might have to pay. By saving estate taxes, such a gift can often be accomplished at very little cost to one's heirs. Your bequest can be a specific dollar amount or all or part of the residue of your estate. Any of the arrangements that can be established during your lifetime can also be established by will, but without the advantage of a current income tax deduction.

For more information about giving to the MGH or about bequests or the tax-saving and income-producing advantages of planned giving, please call or write the Resources and Development Office:

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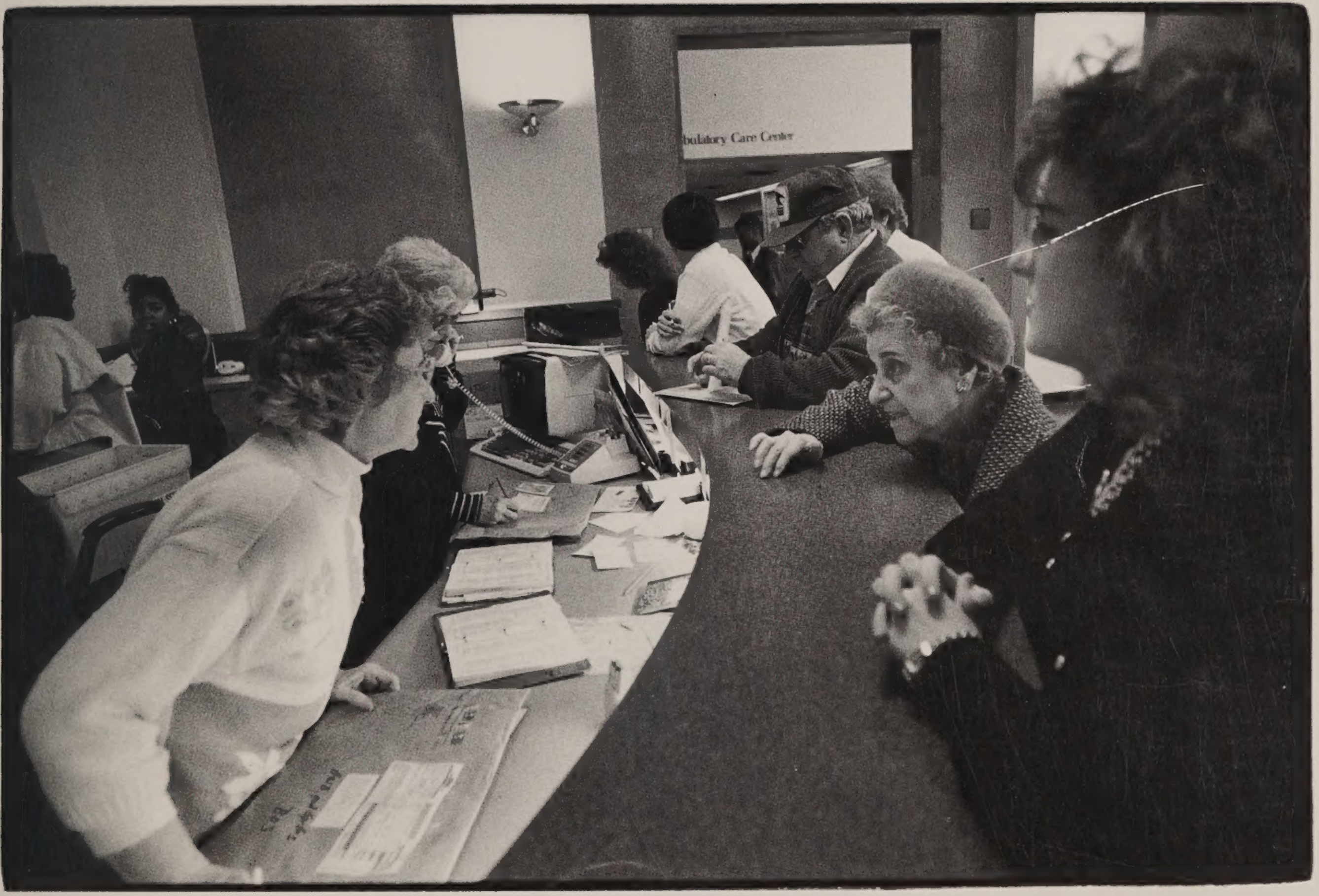
Massachusetts General Hospital
Annual Report 1989


bulatory Care Center

Introduction 1

Photo Essay 2

MGH Year in Review 18

Finance, Facts, Figures 26

Chairman's Report 27

General Director's Report 28

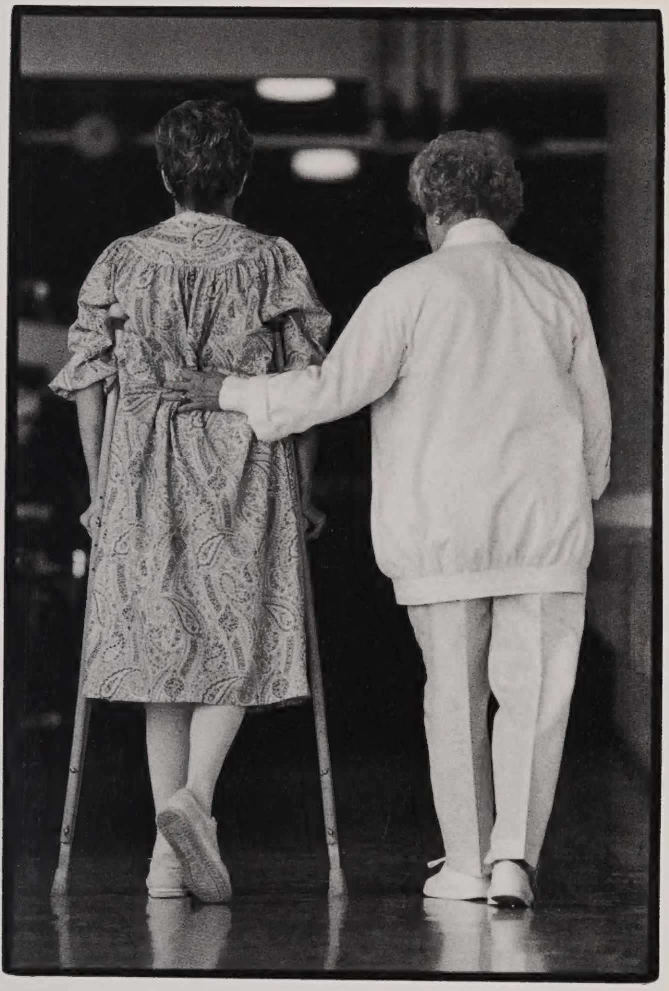
Cover: At the White Building information desk near the Hospital's main entrance, Catherine Hickey and Eleanor Irving greet hundreds of visitors during a typical day. They are among the more visible members of a complex network of people who serve patients at the MGH.

PEOPLE often liken a major teaching hospital to a city because of its size; a theater because of its drama; or an army because of its complex structure and the life-and-death nature of its work. The comparisons fall short.

No city is so directed toward the single purpose of helping people. Theatrical drama pales beside the drama of real illness and injury. No army is fundamentally committed to preserving life.

Simple facts fall short as well. Each year, the Massachusetts General Hospital treats more than 200,000 patients, many of them critically ill. It educates thousands of health care professionals. Its research operation, the largest of any general hospital in the nation, yields advances that help people worldwide and fuel the biotechnology industry. Yet statistics don't explain what this Hospital really does.

The MGH is defined by its people — the people who work here and the patients they treat. No essay can fully recognize the remarkable range of individuals who contribute to patient care at the MGH. But perhaps by meeting a cross section of these people, we may glimpse what it takes to deliver the patient care this Hospital provides. And perhaps the word "hospital" will take on a deeper, fuller meaning.



"PATIENT coming — Trauma One!" Almost at the moment the triage nurse calls the alarm, emergency medical technicians rush into the MGH Emergency Department with a critically injured automobile accident victim whose heart has stopped beating. The relatively tranquil late night routine of a big city hospital shatters in a flurry of activity as physicians and nurses fight to save a life.

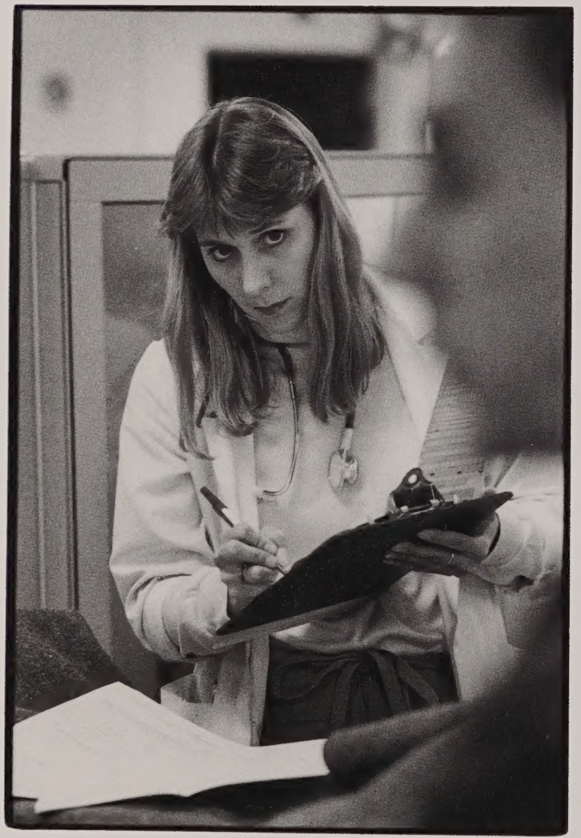
It's 2:30 a.m. and the MGH is in high gear. **Night**

There are many supporting players in this drama. Radiologists help to determine the victim's injuries. A respiratory technician provides oxygen. A member of the transport staff rushes in with blood from the Hospital's blood bank. Elsewhere, medical record personnel track the patient's medical history. A page operator alerts the on-call surgeon.

It's 2:30 a.m. and the MGH is in high gear.

A microcosm of the general hospital, the Emergency Department treats a population the size of a small city — more than 65,000 patients each year. These patients present a vast array of problems, many of them life threatening. Their care depends on a complex network of staff throughout the Hospital who must deliver the services they need at the right moment.

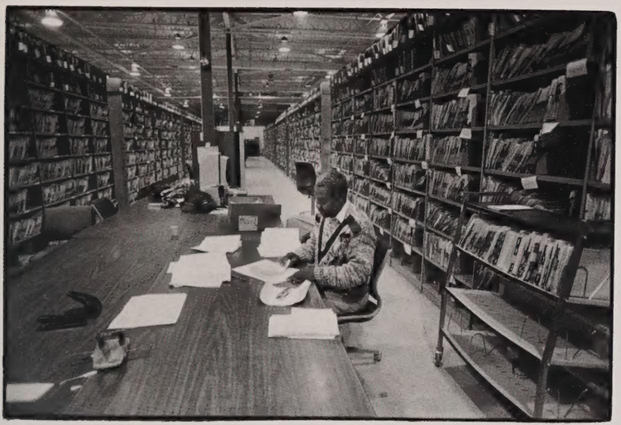
"The faster we address a patient's injuries, the better the chances of recovery," says Dr. Alasdair Conn, chief of Emergency Services.

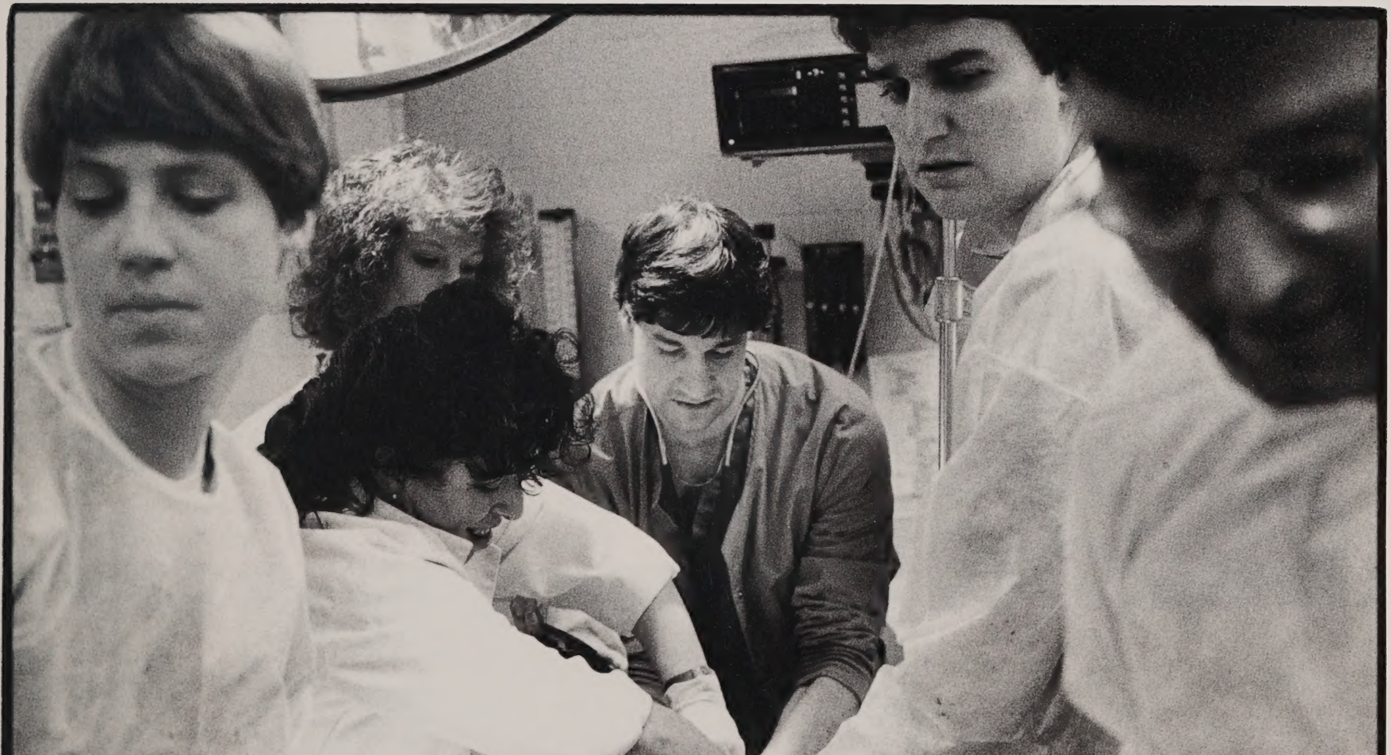


This Page: (Upper) Triage Nurse Julie Clark assesses the severity of a patient's problem. "Triage," a concept developed in World War I, is a system for determining which patients require the most immediate treatment. In addition, the triage nurse alerts the various emergency teams — trauma, cardiac, pediatric, psychiatric — to patients requiring their attention.

Opposite Page: (Upper) Surrounded by more than 1.4 million patient records in a room the size of a football field, James Callahan, night supervisor of the Medical Records Department in nearby Somerville, logs out a patient file for delivery to the Hospital. Such files provide clinicians with information essential to diagnosis and treatment.

An Emergency Department team works to stabilize the accident victim. The team, which includes (left to right) Dr. Ellen Reynolds, Nurse Victoria Brideau, Respiratory Therapist Julie Lewis, and Drs. Steve Lussos, Dean Donahue, and Sal Ruggiero, follows a series of coordinated actions proven to be most effective in treating major trauma of this type.

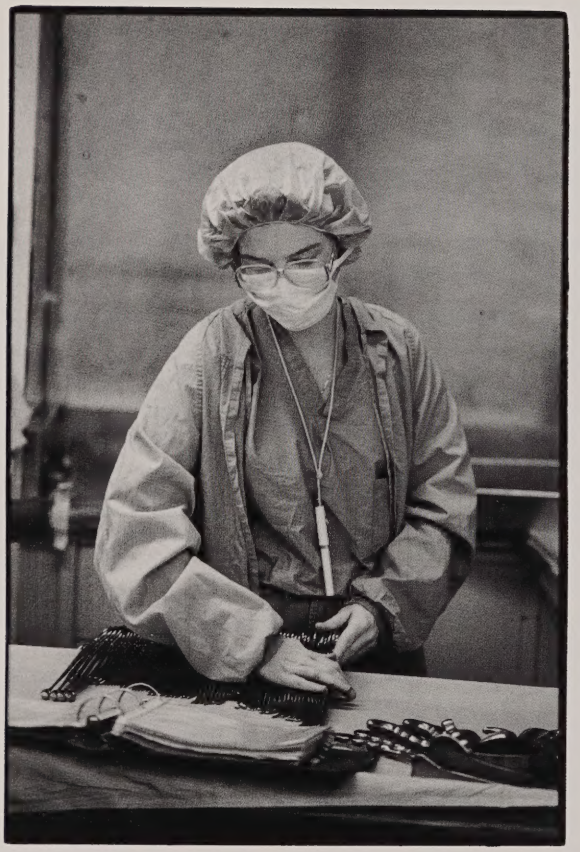




WITHIN minutes, the emergency team restores the patient's pulse and blood pressure, and he is rushed to the operating suite. A surgical team is waiting. An operating room is also waiting — sterilized and equipped with everything the team will need. Nothing diverts their attention from the needs of this patient.

Yet, at this moment, a myriad of activities supports the patient and hundreds of others. Dozens of laboratory technicians conduct tests ordered by physicians. Pharmacists prepare medications to be administered by nurses in intensive care units and on regular patient floors. Engineers maintain monitoring equipment. Materials Management staff prepare the instruments, linen, and garments for tomorrow's surgical procedures. Housekeepers clean hundreds of rooms and miles of corridors. Thousands of staff members like these create a complex infrastructure that functions around the clock.

All of them are vital to patient care.

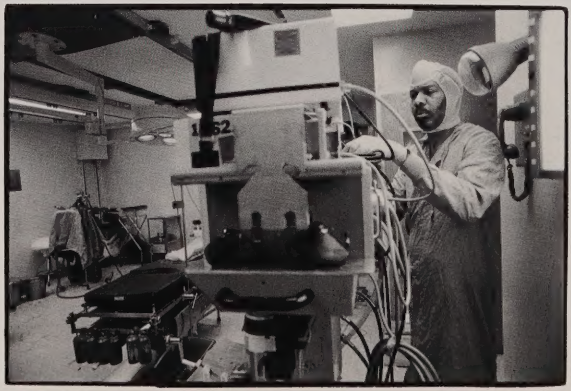


This Page: (Upper) At 4:20 a.m., Harriet Donoghue, an instrument specialist, sorts surgical instruments for the upcoming day's operations. After each use, instruments must be run through a washer/sterilizer and an ultrasonic washer. They are then sorted, wrapped, and terminally sterilized in an autoclave prior to delivery to the operating rooms.

Wendell Coward, an ll-year employee and an anesthesia technician coordinator, conducts routine maintenance on anesthesia equipment in the surgical suite.

Opposite Page: (Upper) A surgical team works on the accident victim's injuries. The team includes Nurse Christine Camarda-Mauch (foreground) and (from left) Drs. Peyman Pakzaban, Brad Drury, Dag Holmsen, and Jon Hupp.

Dr. Brad Drury in the operating room.



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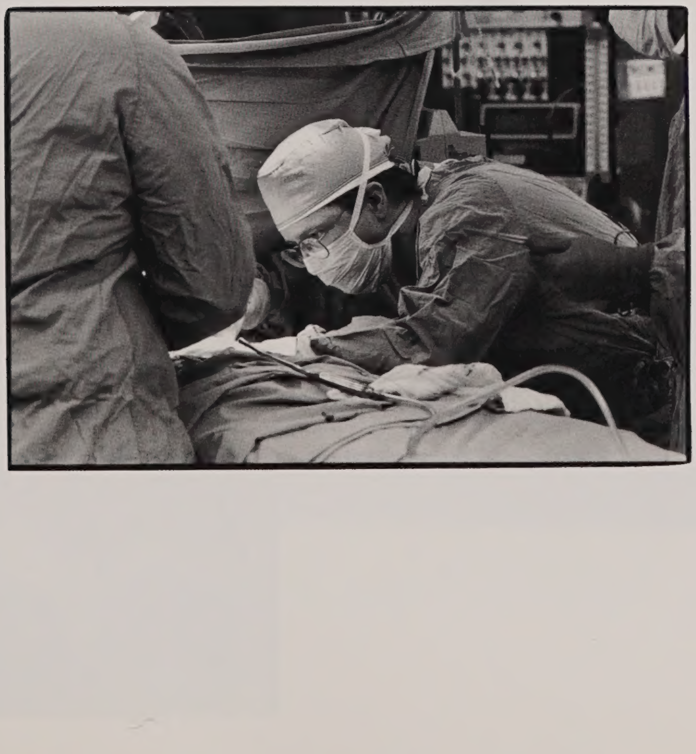
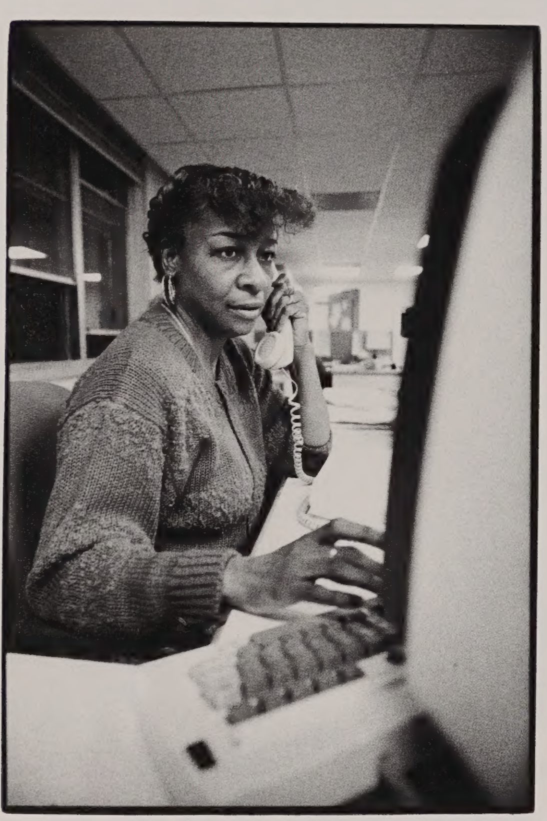
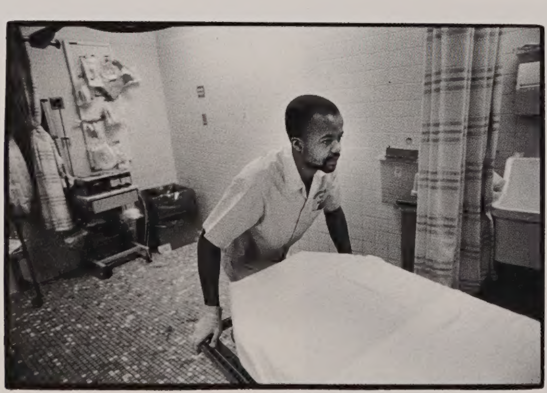


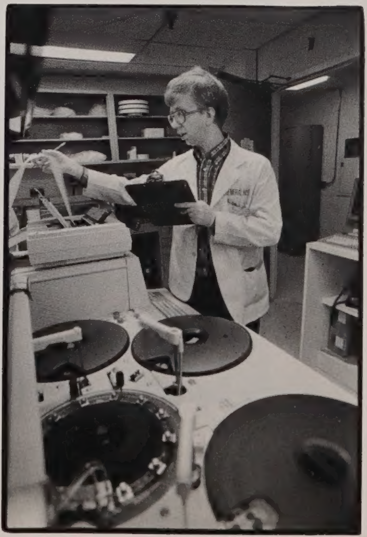
TOO OFTEN in life, what we depend on others to do does not actually occur. A hospital must be an exception to this rule.

As they sent their patient to the operating suite, the Emergency Department staff *knew* the surgical team would be waiting for him and an operating room would be ready. They *knew* that after surgery, he would be safely transported to an intensive care unit, where he would receive second-by-second monitoring, intravenous medication and nourishment, and respiratory support. They *knew* these combined forces would do all that could be done to save this life.

Knowing all this, the emergency team was free to turn its full attention to the next patient.







This Page: (Upper) Sharon Givens, one of three operators working nights in the Communications Department, handles one of the 700 calls she has received in the past five hours. The Communications Department is the Hospital's informational nerve center — the first point of contact for everything ranging from routine patient inquiries to disaster alerts.

Curtis Bryant, a member of the environmental services staff, completes the process of cleaning a major trauma room within the Emergency Department.

MGH clinical laboratories perform more than 12,000 tests each day. Yet, with the help of automated instruments, medical technologists like Ken Bishop of the Clinical Chemistry Lab can produce emergency test results from blood samples in just eight minutes, transmitting them directly to the Emergency Department staff by computer.

Opposite Page: Doris Dion, a 25-year member of the Department of Dietetics, prepares formulas for newborns in the Neonatal Intensive Care Unit. Her department serves nearly 1,000 inpatients three to five times a day. Among these are patients who require tube feeding, special diets, or nutritional supplements. The Department also serves MGH visitors and staff.

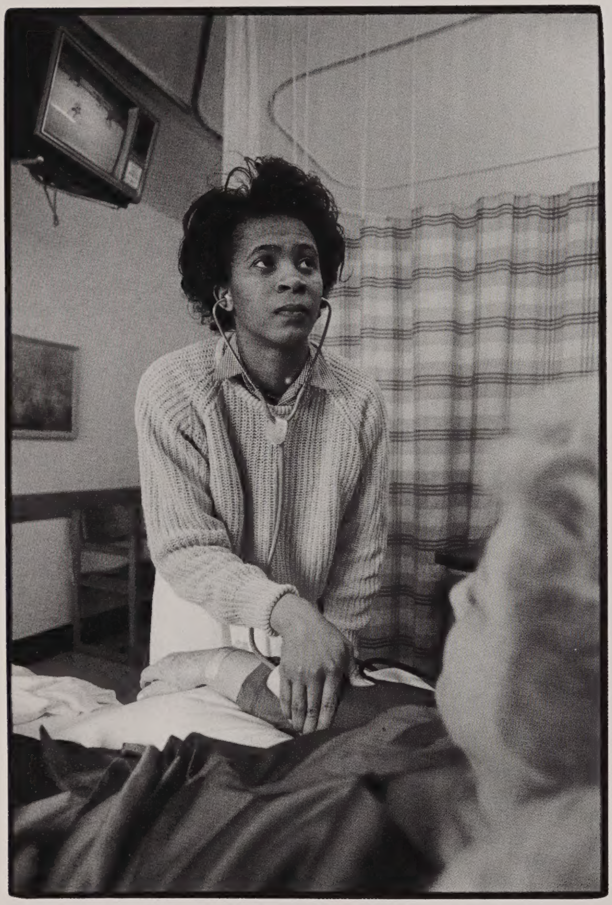
OLY

Complex questions addressed and answered.

Morning

AT 8:45 A.M. the Medical Service nursing unit on the eighth floor of the Bigelow Building bustles with activity. Morning is one of the busier times in the Hospital. Supplies are delivered. Meals are prepared and served. Tests are administered; results weighed. In the midst of all this activity, the needs of each and every patient in the Bigelow 8 unit are heard, considered carefully, and addressed.

How are patients responding to treatment? Are they in pain? How are they coping emotionally with their illness and hospitalization? Do they need a special diet? Physical therapy? What medications are required?

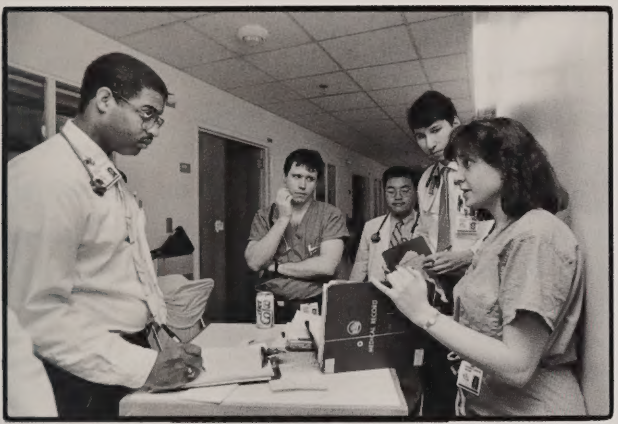


This Page: (Upper) Primary Care Nurse Alicia Laing plans and delivers nursing care for her patient's entire stay on Bigelow 8. The primary nurse concept assures continuity of care for the patient.

Josephine Brooks, a volunteer foster grandmother to patients of the MGH Children's Service, entertains Britney Moniz in the Pediatric Intensive Care Unit. Having been cared for at the MGH throughout her three and a half years of life, Britney is preparing to transfer to Spaulding Rehabilitation Hospital — a major step toward joining her family at home.

Opposite Page: (Upper) Drs. John Carruthers and Ed Ryan, medical student Donald Park, and Drs. Steve Rogers and Margie Baer (left to right), discuss a patient while conducting rounds on Bigelow 8.

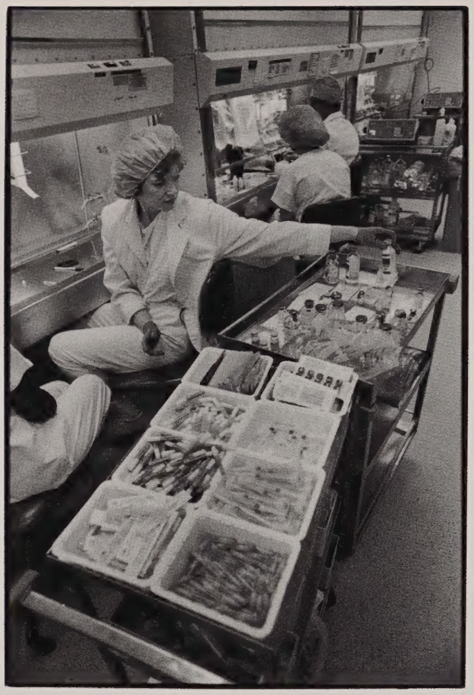
Dr. Roman DeSanctis (second from right), director of Clinical Cardiology and acting chief of the Cardiac Unit, discusses a patient with Drs. Andrew Luster, Daniel Ory, and Mark Hibbard. Drs. Ory and Hibbard are clinical and research fellows specializing in cardiology. Under the supervision of senior staff physicians, they serve as consultants to patients in the Hospital with cardiac problems.


MEDICAL RECORD

OTHER complex questions also must be addressed. How extensive is the illness? Are there alternative treatments? Is surgery required?

And later, still more questions: How long should the patient be hospitalized? Will family or friends be available to support the patient's recuperation after he or she leaves the Hospital, or will special assistance be needed?

On Bigelow 8, nurses, social workers, pharmacists, and dietitians regularly join the Medical Service physicians on daily rounds. Each brings special expertise to assisting a patient's recovery.



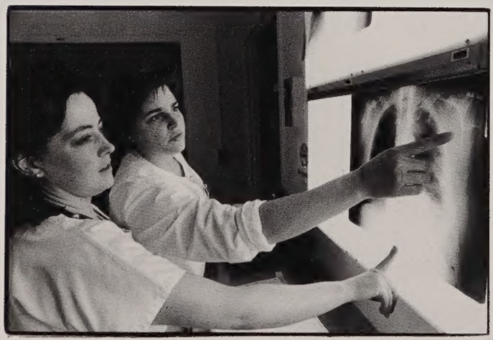
This Page: (Upper) Pharmacy Technician Michelle Olday prepares one of the 1,200 intravenous solutions MGH patients will require during the course of the day. The Hospital's pharmacy also dispenses more than 6,000 oral medications daily.

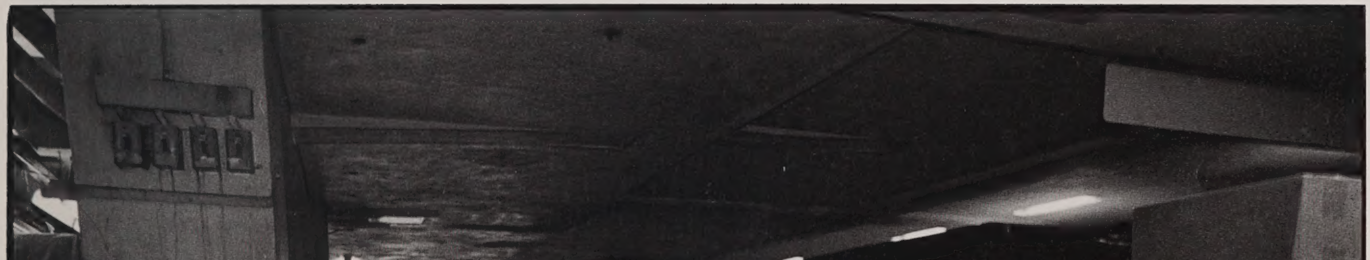
Physical Therapists Susan Colameta and Caroline Nicholson review a patient's chest X rays. They are providing cardiopulmonary physical therapy to help the patient regain the ability to breathe without the aid of a respirator.

Operations Associate Susan Rickey handles a call on Bigelow 8. Operations coordinators and associates help the nursing staff manage medical records, schedule patients for tests, monitor equipment needs, and manage communications in the Hospital's nursing units.

Opposite Page: (Upper) Each day, the Materials Management Department handles more than 20 tons of clean and soiled linens. Grace Rogers, a 25-year employee, prepares a delivery according to the requirements of one of the Hospital's nursing units.

Zedikiah Griffiths records a shipment of the vast range of supplies — sutures, pumps, tubes, syringes, catheters, biopsy trays, bandages, and other items — that Materials Management processes daily for delivery to MGH clinical and research units.

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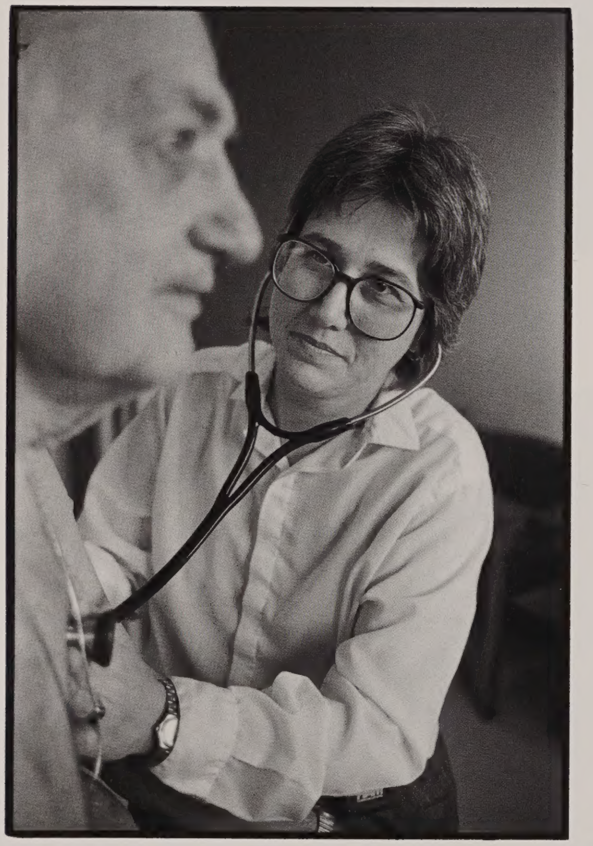
AS THE clinical staff on Bigelow 8 deliberate, thousands of other MGH people are hard at work. Admissions Officers arrange for patients' hospitalization or same-day surgery and help make sure they receive the medical insurance benefits to which they are entitled. Blood bank and blood transfusion staff take and test blood from donors and ensure patients receive the type of blood they need. Secretaries direct patients, arrange appointments, and organize essential information.

"A tremendous range of services is required to care for each patient here — particularly the acutely ill," notes Dr. John Potts, chief of the Medical Services. "But what is truly remarkable is the staff's teamwork in providing those services."

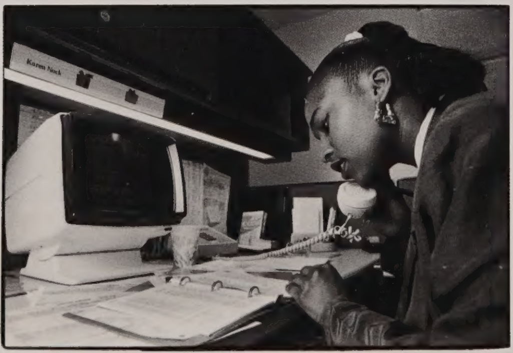


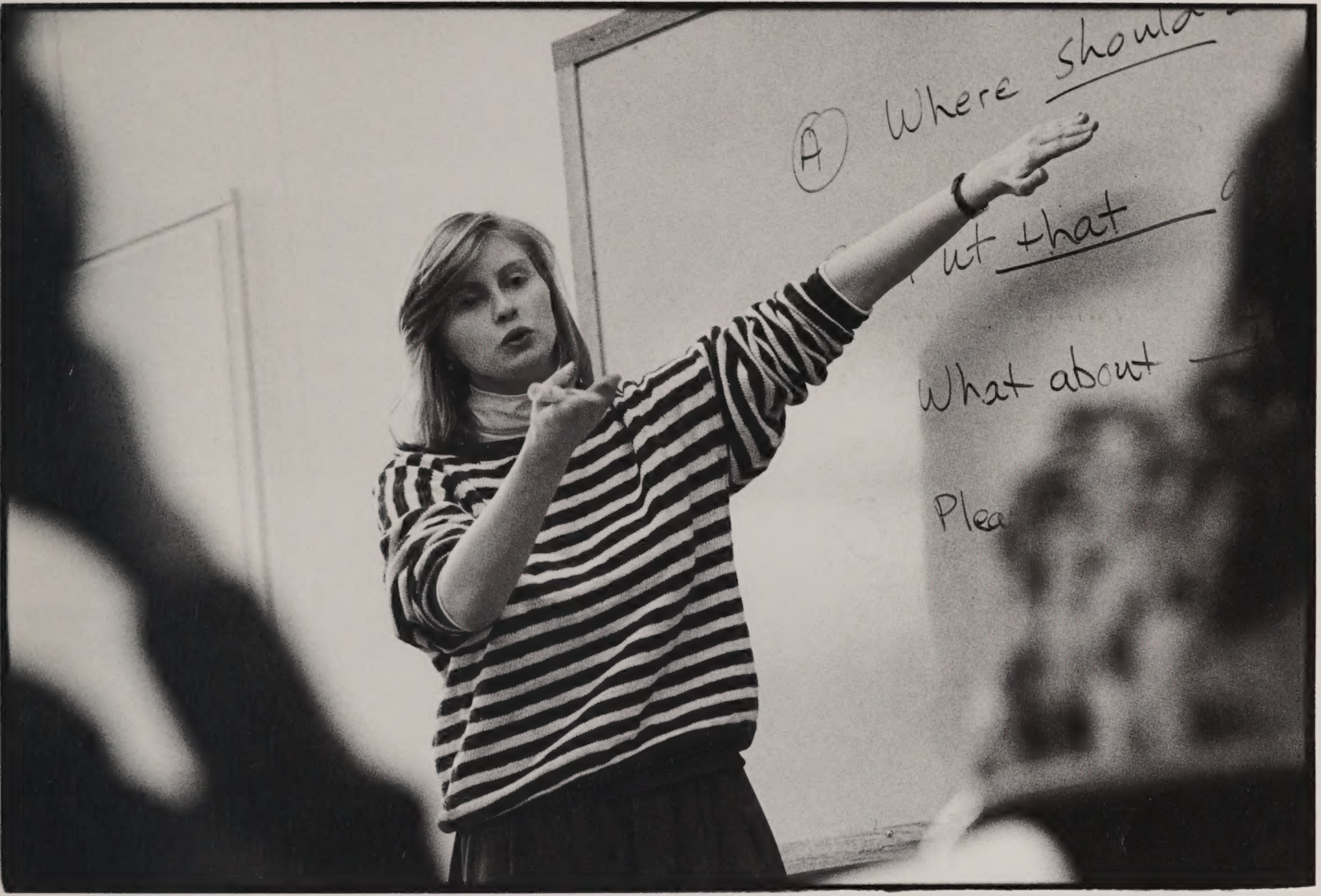
This Page: (Upper) Dr. Nancy Serrell, a primary care physician at the MGH health center in Chelsea, examines one of her patients. The Hospital's health centers in Chelsea, Charlestown, and Revere are the major health care providers in their communities.

Admitting Interviewer Karen Nock confers with an insurer to double-check a patient's insurance coverage for a specialized medical treatment. Admissions staff also assist patients who require hospitalization or are undergoing outpatient surgery by arranging for pre-admission testing and reserving hospital rooms, if necessary.

Opposite Page: (Upper) The MGH offers professional development programs ranging from basic education and high school equivalency courses to accredited courses in specialized areas of clinical practice. Here Marie Keem teaches a course in English as a second language.

At the White front desk, Catherine Hickey (foreground) and Eleanor Irving direct MGH visitors to their destination within the Hospital. The MGH receives more than a half-million patient visits a year through a network of ambulatory specialty practices, a medical walk-in unit, a same-day surgery unit, and neighborhood health centers.

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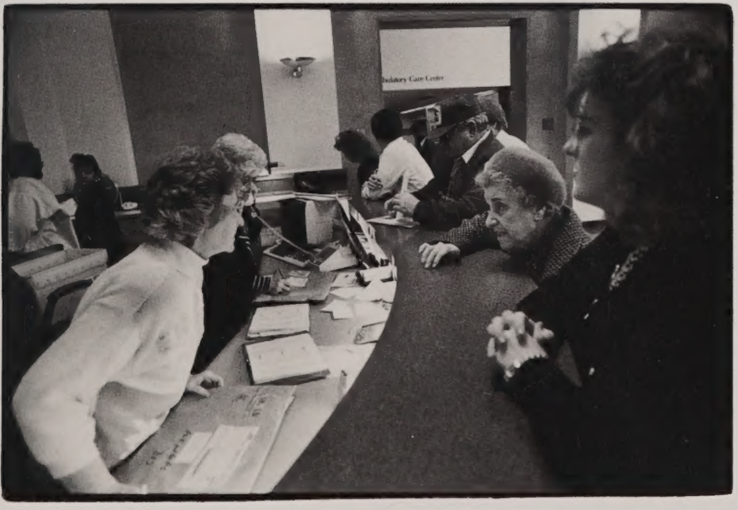
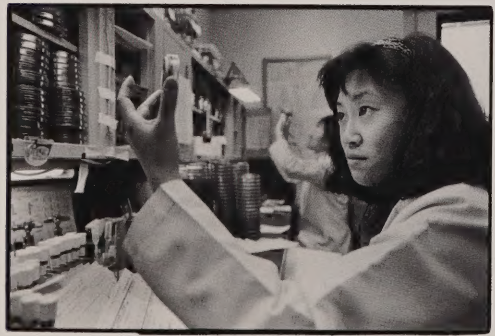


Achieving a delicate balance **Afternoon**

TWELVE-year-old Sheri Gobin is full of the giggles. She has good reason to be in high spirits. After suffering from kidney failure, she received a donated kidney from her father, Richard, in October. Since then, she has made remarkable progress. "She's grown a quarter of an inch in the past couple months,'' he reports.

Sheri is among more than a hundred patients of all ages and backgrounds to receive an organ transplant at the MGH in 1989. The MGH is one of only a few medical centers in the world that performs transplants of five organs — heart, kidney, liver, pancreas, and bone. Despite the Hospital's impressive record of success in this area, many transplant patients face a precarious journey to health.

"Patients who need transplants often suffer other serious problems, such as respiratory failure or the failure of other organs," explains Dr. Paul Russell, chief of transplantation. "We must address these complications as well as the primary problem. And during and after the transplant we must achieve a delicate balance between suppressing the immune system to allow the patient to accept the new organ while at the same time protecting the patient from infection."



This Page: (Upper) Dr. A. Benedict Cosimi, chief of clinical transplantation surgery, examines Sheri Gobin at her regular checkup for any signs of organ rejection or adverse side effects from the drugs that help her immune system tolerate her new kidney.

Claudia Comerford, a medical technologist in the Histocompatibility Laboratory, compares key genetic characteristics of transplant candidates and potential donors in a process called "tissue typing." This series of tests is critical in determining whether a donated organ will be accepted by the recipient's immune system. On the shelf before her hangs a list of MGH patients awaiting a transplant.

Because their immune systems must be suppressed to tolerate a donated organ, transplant patients are susceptible to infection. Cindy Inashima and other medical technologists in the Bacteriology Laboratory pinpoint infections present in patients' systems and identify the antibiotics that will be most effective against them.

Opposite Page: Each week the staff involved in transplantation — medical and surgical specialists, psychiatrists, social workers, nurses, laboratory technicians, pharmacists, dietitians, and others — meet to discuss their concerns and recommendations for transplant candidates, donors, and recipients.

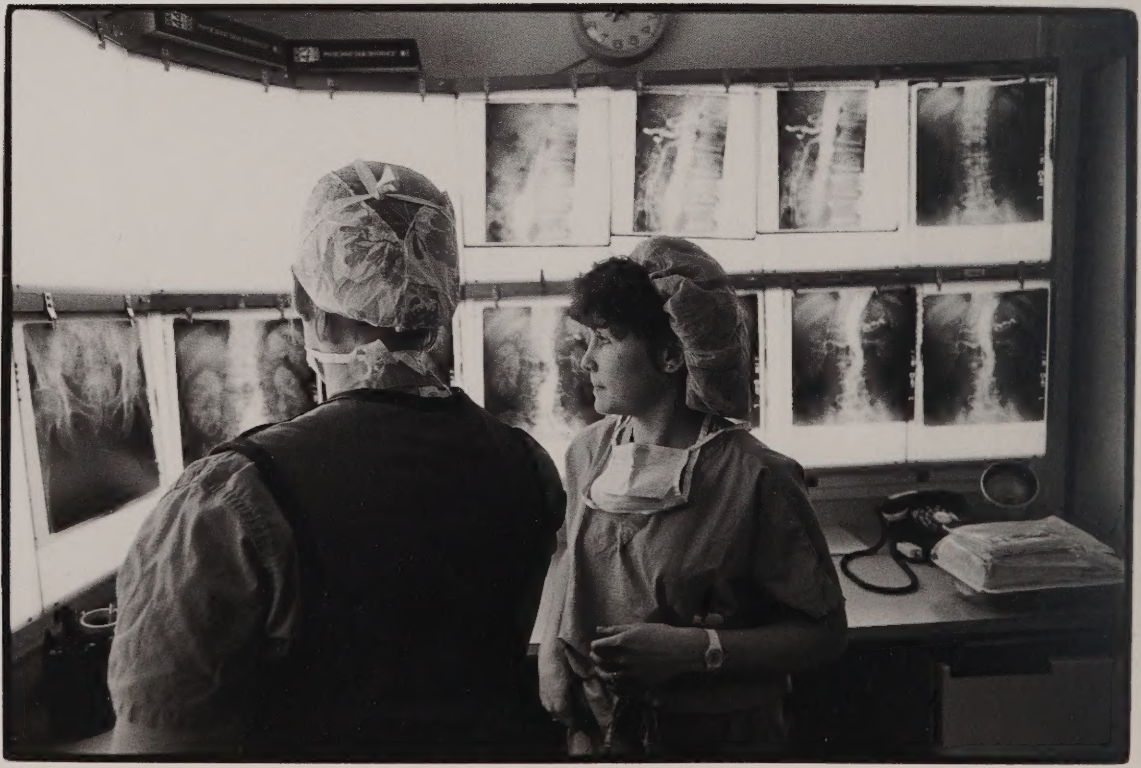
IN ADDITION to her pediatric nephrologist, Dr. John Herrin, and her transplantation surgeon and nurses, an army of MGH staff have been involved in Sheri's care: specialists in kidney, liver, and infectious disease, urology, and cardiology. Radiologists. Social workers. Laboratory technicians. Pharmacists. Nutritionists. Switchboard operators. Maintenance staff.

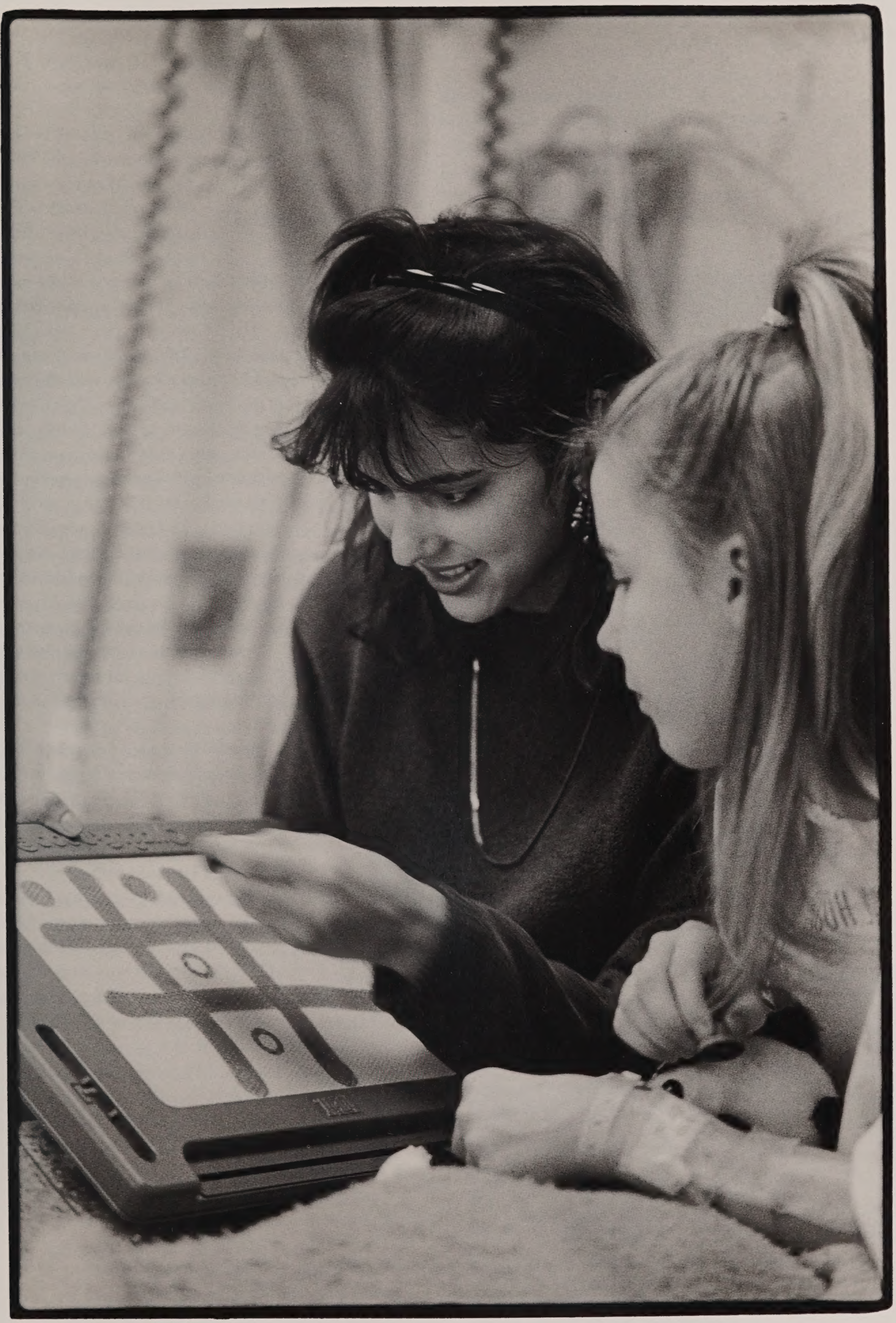
Sheri has never met many of them. Yet because of their efforts, she is enjoying a full and promising life.

This Page: (Upper) On the roof of the Phillips House, Skip Simard, a 30-year employee of the Buildings and Grounds Department, inspects the filtering systems which serve the Transplantation Unit. These systems protect patients whose immune systems are suppressed by keeping the air in their rooms free of potentially infectious agents.

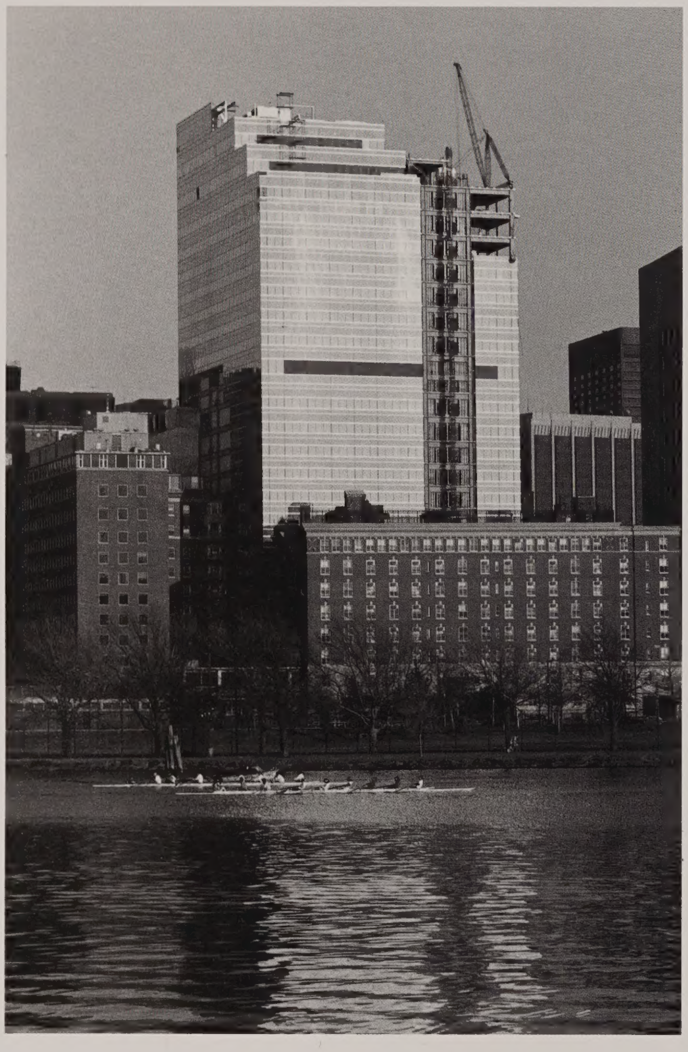
Dr. Barbara Byse, a vascular radiologist, and Breige Kerr, a radiology technician, study test films to determine the correct positioning, technique, and beam penetration for an X ray of the blood vessels surrounding a patient's transplanted organ. Their goal is to help determine if the organ is receiving a healthy supply of blood.

Opposite Page: In an orthopaedic unit, Social Worker Leila Gupta visits with Angie Severns, a young bone cancer patient preparing to undergo allograft surgery. The MGH pioneered this procedure, which replaces diseased bone with donated healthy bone from individuals who have died.





The MGH Year-in-Review Progress



A capital success

By the end of the 1989 fiscal year, the Campaign to Rebuild the MGH had reached $156.7 million and appeared well on its way to achieving its $169 million goal.

Already the fruits of the eight-year Campaign are visible throughout the Hospital campus. Most prominent is a glass 24-story inpatient tower that will be completed in 1990. This building and a second 15-story inpatient tower scheduled to open in 1994 will complete the rebuilding of the Hospital's facilities.

The rebuilding program began with the renovation of the White and Bigelow inpatient buildings and continued with the construction of the Wang Ambulatory Care Center, which now receives more than 365,000 outpatient visits a year. Other construction projects completed with Campaign support include the Wellman Research Building, which provides laboratories for researchers in photomedicine, the neurosciences, and microbiology, and a new cardiac catheterization laboratory, named in honor of James Knight, chairman emeritus of the Knight-Ridder newspaper enterprise.

Funds from the Campaign also will support the expansion of the Emergency Department and the creation of an intraoperative radiation unit.

Finally, Campaign funds are being raised to establish an endowment for the MGH Institute of Health Professions, which awards Master of Science degrees in dietetics, nursing, and physical therapy, and has programs in ethics and speech-language pathology.

"The outpouring of support from our MGH family is tremendous," said Mrs. Jane Claflin, co-chair of the Campaign. "Their generosity will help ensure that the Hospital upholds its long tradition of providing the finest medical care."

Laser advances

This year the federal government approved two new advances in laser medicine: one for removing bile duct stones and another for clearing tattoos with little if any scarring.

MGH dermatology research fellow Dr. Charles Taylor reported in April 1989 that 25 tattoos on 13 patients were successfully cleared using a pulsed ruby laser. This instrument delivers very high-intensity pulses of red light that are absorbed by most tattoo pigments and minimally by the skin's blood vessels. Since the treatment has little effect on the tissues surrounding the tattoo, scarring rarely occurs.

The new technique is virtually painless. All of the other techniques available for removing tattoos are painful and leave disfiguring scars.

In June, the U.S. Food and Drug Administration approved a new therapy for removing bile duct stones called "laser lithotripsy." The action came after MGH researchers and their colleagues elsewhere reported success in clearing large stones from the majority of the 14 patients they treated with this therapy. Due to their location, bile duct stones are often difficult to remove using other standard nonsurgical techniques.

Dr. Norman Nishioka of the MGH Gastroenterology Department said laser lithotripsy could be especially useful with elderly patients, who are often high-risk candidates for surgery. Other centers involved in the study were the Virginia Mason Clinic in Seattle, Washington, and the Duke University Medical Center in Durham, North Carolina.

New anti-cancer tactics

In MGH patient trials, interleukin 2 (IL-2), a hormone-like substance found in the immune system, has shown promise in combating kidney and skin cancer. In mid-1989, MGH researchers began expanding upon these trials to determine if IL-2, in combination with the protein interferon, also would prove effective against other types of cancer.

In the earlier trials, cancer-fighting white cells were removed from patients' tumors and IL-2 was used to boost their numbers. Then the white cells were reintroduced into patients. Tumors in many of the individuals with kidney and skin cancer shrank.

Under the direction of Dr. Richard Kradin of the Immunopathology and Pulmonary Units, MGH researchers now are expanding upon these results and also are studying the effectiveness of IL-2 and interferon against lung and head and neck cancers.

Early osteoporosis

Osteoporosis is generally of concern for elderly people, especially postmenopausal women. However, MGH physicians reported that the bone loss leading to osteoporosis can get an early start in teenagers who are obsessive dieters.

A common result of anorexia nervosa is a halt in menstruation, or amenorrhea. The MGH team studied a group of young women aged 15 to 42 who had anorexia during their adolescence and found they had much lower bone mass than counterparts who experienced amenorrhea as adults.

Dr. Anne Klibanski led the research team, which published its findings in March 1989. She said the bone loss stems from a hormonal imbalance linked to the lack of nutrition and failure to menstruate.

Often, amenorrhea in teenagers is not considered serious; however, the study's results indicate that this condition can lead to severe problems with osteoporosis and may require treatment at a young age.

Skin disorders unit

In February 1989, the MGH Dermatology Department established a new unit to test promising treatments for skin disorders.

The Clinical Investigations Unit, currently directed by Dr. Lynn Drake, is carrying out patient trials of treatments for psoriasis, fungal diseases, skin aging, acne, and other skin disorders.

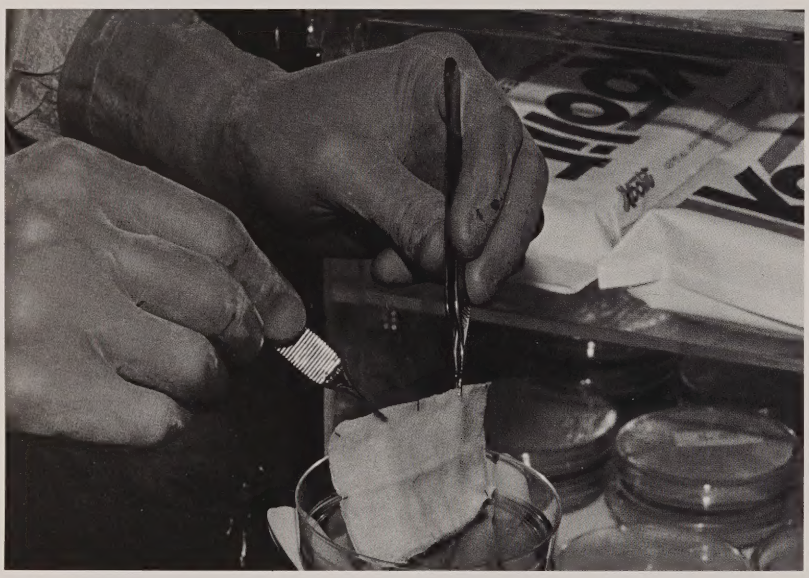
Mr. Ernest Caras (left) with his physician, Dr. Richard Kradin. Following interleukin 2 therapy, Mr. Caras's melanoma (the most serious form of skin cancer) has been in remission for two years.

Laboratory grown skin

In a successful attack on another kind of skin problem, surgeons at the MGH and Shriners Burns Institute used an innovative technique for growing skin to surgically replace massive birthmarks in children.

In this approach, physicians use a special culturing technique to grow a small piece of unaffected skin to many times its original size. Eight youngsters ranging in age from nine months to 12 years of age were treated. Dr. G. Gregory Gallico III, the plastic surgeon who headed the trial, said the new approach sharply reduces the amount of skin that must be transferred from other parts of the patient's body.

The technique was developed by researchers at the Harvard Medical School, the MGH, and Shriners Burns Institute.



Laboratory grown skin

Testing an AIDS drug

MGH physicians began trials in October 1988 to test the safety of a new drug that may work as a "decoy" for the AIDS virus.

The drug, called CD4, is a molecule that naturally occurs on the surfaces of certain types of white blood cells. To enter these cells, the AIDS virus must first bind to CD4. Researchers at Biogen, a Cambridge-based biotechnology firm, used genetic engineering to create a free-floating version of the CD4 receptor.

"We suspect that once the virus binds to the free-floating CD4, it is unlikely to infect a cell," explained Dr. Robert T. Schooley of the MGH Infectious Diseases Unit who heads the trials. In the test tube, CD4 blocked both direct infection of cells and transmission of the virus between cells. If it works well, it may help slow or reverse the ability of the virus to damage the immune system.

Protecting newborns

Studies by MGH researchers pointed out the cause of an inflammatory disease that has been fatal in infants and suggested a strategy for preventing the illness.

The disease, necrotizing enterocolitis, strikes between 2,000 and 4,000 U.S. newborns a year, 80 to 90 percent of whom are born prematurely. Symptoms include inflammation, bloody diarrhea, and, ultimately, the development of holes in the intestinal wall. Dr. W. Allan Walker, chief of the joint MGH-Children's Hospital Program in Pediatric Gastroenterology and Nutrition, said the children were probably at risk because their intestinal walls were underdeveloped and weren't capable of eliminating disease-causing bacteria.

The death rate has been cut sharply through the use of antibiotics and intravenous feeding. (The latter reduces the number of bacteria the infants are exposed to during feeding.) In addition, MGH researchers said animal experiments suggest that administering steroids to mothers deemed likely to give birth prematurely may reduce the mortality rate even further.

Help for substance abusers

Where does someone who no longer needs to be hospitalized for drug or alcohol treatment, but still requires intensive therapy, find help?

The MGH is providing assistance in the form of a new outpatient program set up in late 1988 by the West End Group Practice, the Hospital's drug and alcohol treatment unit. The program, said Dr. David Gastfriend, the group practice's director, allows patients to carry on with their daily lives while giving them the support they need. That's important, he said, because "ideally, sobriety should be established in the patient's own environment."

Patients come in for individual and group sessions as many as five nights each week. They learn the health effects of drugs and alcohol, get help in devising a plan for daily living, and learn techniques for coping with tension, depression, and symptoms of withdrawal.

Sister Agnes Claire Buckley

Heartfelt ties

Sister Agnes Claire Buckley, a parochial school teacher, and Henry Tobyne, a school custodian, have a bond forged out of an unusual shared experience.

Sister Agnes and Mr. Tobyne met in an MGH support group for heart patients. Their friendship blossomed when both were chosen to receive heart transplants and endured the uncertain wait for donated organs. Finally, both received new hearts in the space of a few days in September 1989. "We do everything within a week of each other," quipped Mr. Tobyne.

Though the pair's experience is unique in many respects, the fact that both had successful transplantations is not.

In 1985, the MGH, in concert with three other leading Boston hospitals, began performing heart transplants. Since then, the MGH has boosted the success rate of the transplants to 80 percent.

Such progress is partly due to the Hospital's contributions to reducing the chances of organ rejection, the primary risk for transplant recipients. An MGH team headed by Dr. A. Benedict Cosimi has developed two widely used anti-rejection agents, OKT-3 and antithymocyte globulin.

Obtaining hearts, however, remains a serious problem. "We've seen a slow increase in donations in recent years," said Dr. G. William Dec, medical director of the MGH Heart Transplantation Program, "but unfortunately the growth in the number of would-be recipients has outpaced that of donors."

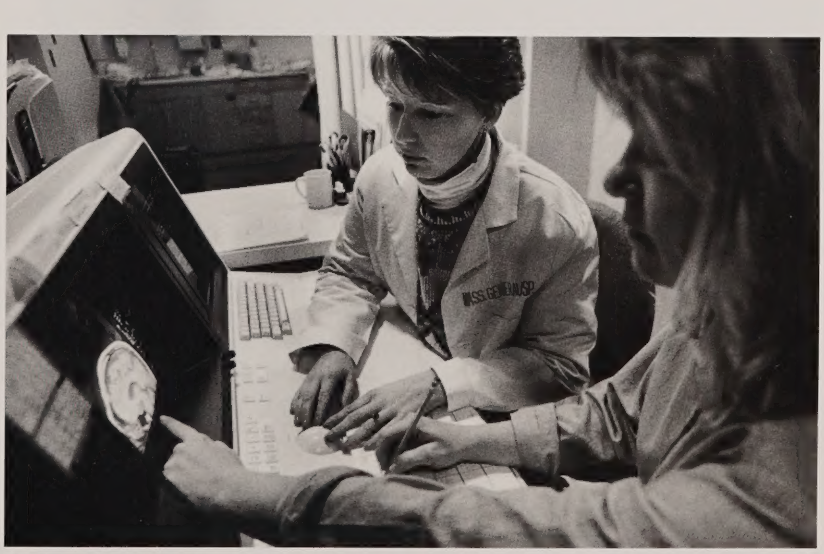
State-of-the-art MRI

In March, the MGH Health Services Corporation created a magnetic resonance imaging center at the Charlestown Navy Yard. The center, which encompasses clinical, research, and educational activities, is under the direction of Dr. Thomas Brady, associate radiologist-in-chief for research.

The MGH Imaging Center, the clinical arm, has significantly increased the MGH's magnetic resonance imaging (MRI) capabilities. The Center's system provides MR images of normal and pathologic soft tissue structures with detail not available using conventional X-ray techniques such as computed tomography (CT) scans. The new equipment is able to pinpoint very small tumors. MRI is the procedure of choice for assessing diseases of the brain and spine and for many musculoskeletal problems.

The Charlestown system also is an invaluable research tool. Among other projects, MGH investigators are exploring the use of MRI to locate narrowing in arteries, avoiding the need to inject special dyes into the vessels.

The MGH helped pioneer the development of MRI. It was the first hospital in the United States to have a clinical magnet on site and to establish an MRI diagnostic and research program.



MRI technicians Nancy Yourkewicz and Kathy Tabor McEwan (left) review an MRI scan of the brain to ensure that the scan is technically accurate.

A therapeutic coma

A 15-year-old suffering from one of the most severe cases of epilepsy on record was restored to near normal health with the aid of a drug-induced coma.

The youth, Bobby Bolduc of Somerville, Massachusetts, was in a semi-comatose state and partly paralyzed when brought to the MGH in January 1989. Bobby's seizures, or series of seizures, lasted four to six weeks, rather than a few minutes each. When Bobby did not respond to medications, his physicians decided to induce a coma while continuing drug therapy.

Although the seizures continued during the four-day coma, the drugs used to bring on the coma "seemed to be the turning point," said Dr. Gabrielle DeVeber, the MGH neurology fellow who admitted Bobby. The patient, who had suffered modest brain damage as a result of the seizures, was released in July after therapy at the MGH-affiliated Spaulding Rehabilitation Hospital and was doing well.

After successful treatment at the MGH, Gayane Gasperian hears that she can return home to Armenia.

Reaching out

The MGH and Shriners Burns Institute twice reached out to severely injured children from the Soviet Union.

Four young people from Armenia were treated for head or leg injuries in the wake of the December 1988 earthquake that claimed 25,000 lives in that Soviet region. One child, Gayane Gasperian, 12, required reconstructive surgery for an injury that left a large hole in her skull. The other youngsters had equally serious injuries. The four arrived at the MGH in early February 1989.

The Armenians were among 37 children whose care was organized by Project Hope, the relief agency. Dr. John Remensnyder, the Burns Institute's chief of staff and an MGH plastic surgeon, was on the team that traveled to the Soviet Union to select patients who would benefit from treatment at American medical centers.

Another disaster, a natural gas explosion in the Ural Mountains, struck the Soviet Union in June 1989. In damaging two trains, it killed more than 600 passengers, most of them children, and left hundreds more injured.

A Shriners-MGH team, including Drs. Remensnyder and Frederick Ackroyd, spent two weeks in Moscow treating 23 badly burned youngsters brought to a hospital there after the explosion.

"I cannot overemphasize the cordiality and cooperation extended to us during our two weeks at the hospital," Dr. Remensnyder said.

Promise

Studying the skin

Shiseido Co. Limited, a Japanese pharmaceutical and cosmetics firm, awarded a 10-year, $85 million contract to set up an MGH-based center devoted to skin research.

The MGH-Harvard Cutaneous Biology Research Center will be located in Building 149 at the Charlestown Navy Yard, site of several other MGH research operations. The Center is headed by Dr. John Parrish, chief of the Dermatology Service.

The Center will eventually employ about 100 scientists and support staff. "The fruits of their studies will ultimately benefit people all over the world," said Dr. J. Robert Buchanan, the Hospital's general director. The skin, noted Dr. Parrish, is our first line of defense against many sources of harm, from ultraviolet light to toxic substances. At the same time, it is prey to "maladies ranging from superficial irritants to invasive life-threatening cancer."

The Center will focus initially on basic research on the nature of the skin. In time, researchers will move on to clinically related studies, though the Center will do no clinical testing or commercial product development.

Dr. Parrish will set the Center's research agenda, while Harvard Medical School and Shiseido will serve as advisors. The MGH will have the opportunity to patent any inventions, and Shiseido will have the right of first refusal to license them and then will pay the MGH royalties on any marketed inventions.

A major goal of the Center is to use the techniques of molecular biology to study the skin. Learning how the skin works is a first step in finding better means for protecting or treating it, observed Dr. Parrish.

Biological clocks

A team led by the MGH's Dr. Steven Reppert pinpointed the location where the hormone melatonin acts within the brain to regulate the workings of our internal "clocks."

Melatonin has long been known to function in the system by which our bodies track time, but until now, researchers were unable to pinpoint the site of its action. Dr. Reppert, with associates from the MGH and Tufts University, reported in October 1988 that a brain structure called the SCN has been identified as the site of our biological clock. This tiny region in the hypothalamus harbors receptors for melatonin.

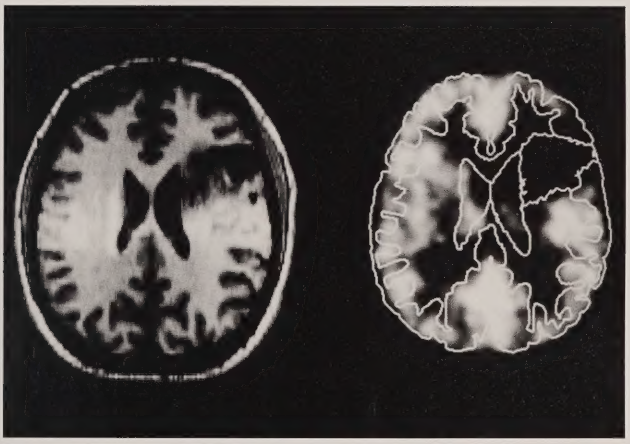
The finding may yield new strategies for helping people who suffer from sleeplessness because their light-dark cycle has been disrupted by jetlag or by working staggered shifts.

Neuroscience Center

In November 1988, the Hospital announced the creation of the MGH Neuroscience Center in Building 149 at the Charlestown Navy Yard.

The Center will serve as the main locus for interdisciplinary research by MGH experts in neurology, neurosurgery, and psychiatry. The Hospital is noted for its achievements in the brain sciences, and the new Center will allow the MGH to both integrate and expand its research on the brain and on treatments for neurologic and psychiatric diseases.

Simultaneously, the MGH announced that E.R. Squibb & Sons, the pharmaceutical firm, had awarded a $6.4 million contract to support the Center's Molecular Neurogenetics Laboratory. Headed by Dr. James Gusella, the laboratory explores the genetic roots of hereditary brain diseases.



Through a technique pioneered by the MGH, researchers in the Neuroscience Center can precisely pinpoint injured areas of the brain. Using a computer modeling program, an MRI scan (left), which shows the anatomical structure of the brain, is superimposed (right) on a positron emission tomography (PET) scan, which gives a functional picture of the brain. The resulting image clearly shows the damage (the black area in the upper righthand quadrant) caused by this patient's stroke.

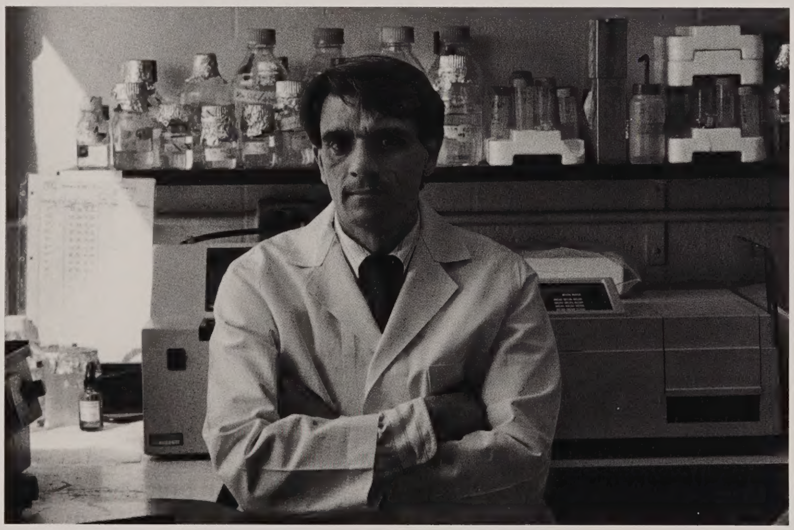
Multiple sclerosis and genes

MGH physicians and their collaborators became the first to link multiple sclerosis with a specific group of genes, a finding that could eventually lead to more effective treatments for MS.

The group, led by Dr. Stephen Hauser, reported that the risk of MS can be traced to a gene complex located on one of the 23 pairs of chromosomes that are found in human cells. The MS-related gene contains information for one of two proteins making up cell-surface receptors of immune system T-cells. However, not everyone who carries the susceptibility gene is afflicted by the disease, Dr. Hauser said. It appears, he noted, that the genes "work in concert with other genes, and possibly with factors such as viruses."

In MS, white blood cells attack the tissues that serve as a coating for our nerves. This can lead to numbness, paralysis, loss of vision, and other symptoms. The disease affects an estimated 250,000 Americans.

The studies, reported in June 1989, involved researchers from the MGH and the National Institute of Allergy and Infectious Disease.



Dr. Stephen Hauser

A genetic warning signal

In another breakthrough, researchers from the MGH and elsewhere reported in May 1989 that they had found a genetic marker — in effect, a warning signal harbored within an individual's DNA — for dystonia, a nervous system disorder.

Between 70,000 and 100,000 North Americans are thought to suffer from dystonia, the symptoms of which can range from stuttering or mild tremors to severe muscle contractions. Since the disease is often misdiagnosed, its exact extent is unknown.

Finding the genetic marker may eventually allow physicians to test individuals at risk for the disease. Meanwhile, it should help people become aware of dystonia, said Dr. Xandra Breakefield, an MGH neurologist and a faculty member in the Neuroscience Program at Harvard Medical School.

The Columbia-Presbyterian Medical Center, Yale University Medical School, and Oregon Health Science Universities also were involved in the research.

Tumor suppressor

MGH researchers reported that certain proteins found on the surface of cells may have previously unrecognized effects on the growth of tumors.

The proteins, called transplantation antigens, are known best for their role in enabling our systems to tell "self" from "non-self" tissues. For example, following organ transplantation, they trigger the immune system to attack the "foreign" tissue. It is this response that physicians must dampen to prevent organ rejection.

In November 1988, Dr. Sebastiano Gattoni-Celli and his MGH Cancer Center associates reported that the antigens, also known as class I major histocompatibility complex (MHC) proteins, may have an additional effect unrelated to their role in the immune system. They introduced a gene coding for part of a mouse MHC protein complex into cancerous cells and found that it decreased the malignant properties of the cells.

The finding suggests the possibility of an anti-cancer strategy based on manipulating MHC levels. The investigators cautioned, however, that much more research is needed before that prospect can be pursued.

People

Honoring Lawrence Martin

Many call him "Mr. MGH," and his reputation rests, in part, on his legendary ability to accomplish things that others deem impossible.

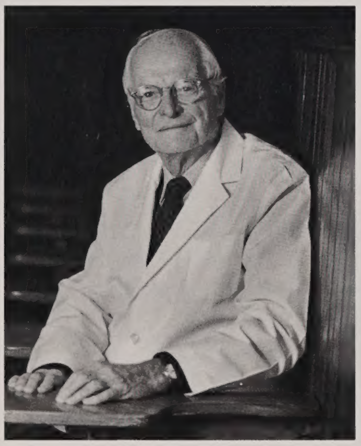
So it was fitting when the Hospital decided to name its Charlestown Navy Yard facilities in honor of Lawrence E. Martin, the senior vice president and a 40-year veteran of service to the MGH.

Mr. Martin joined the Hospital in 1949 as a cost accountant. He assumed his present position in 1974. Mr. Martin also is a consultant to Harvard Medical School's dean of the faculty and has served on advisory committees for a variety of federal agencies and nonprofit institutions. These include the Board of Trustees of the Massachusetts Hospital Association, the Judge Baker Guidance Center, the Spaulding Rehabilitation Hospital, and the International Grenfell Association.

The Lawrence E. Martin Laboratories include the research arm of the MGH Cancer Center, the new Neuroscience Center, and the new Imaging Center, among other facilities.

In December 1988, when the laboratories were dedicated, the Hospital already had leased 400,000 square feet of the Navy Yard's Building 149. By the end of the fiscal year, the Hospital had leased all 650,000 square feet of the building. As a result, the MGH has the largest research program of any independent hospital in the nation.

Mr. Lawrence Martin



Dr. Oliver Cope

Ms. Mary Macdonald

Long-standing service

The MGH honored 760 employees with five, 10, 20, 30, 40, 50, and 60 years of service during Ether Day ceremonies commemorating the first public demonstration of the use of anesthesia in surgery on October 16, 1846.

Dr. Oliver Cope of the Surgery Service was recognized for 60 years of service to the Hospital. Dr. Cope is honorary surgeon at the MGH and professor of surgery emeritus at the Harvard Medical School. He has extensive research and clinical experience in endocrine surgery and was one of the first surgeons to recognize the importance of psychiatry in the care of patients.

In the treatment of breast cancer, he was among the first to argue in favor of limited surgery with radiation and chemotherapy as an alternative to radical mastectomy in less advanced cases. He also pioneered therapies for burn victims.

Dr. Irvin H. Blank, associate biochemist in dermatology at the MGH and retired assistant professor of dermatology at the Harvard Medical School, was honored for 50 years of service. Although now 21 years past retirement age, he continues research in his major area of interest — percutaneous absorption.

Portrait of a nurse

In honor of her commitment and contributions to the MGH and its Nursing Service, the MGH Nurses' Alumnae Association commissioned a portrait of Mary Macdonald, R.N., which was unveiled in May, 1989. The portrait now hangs in the Walcott Rooms of the Wang Ambulatory Care Center.

Ms. Macdonald directed the Department of Nursing from 1968 to 1983. During her tenure, she helped expand the professional status of nurses and restructured nursing practice to better reflect the patient care, teaching, and research aspects of the profession.

The General Hospital Corporation

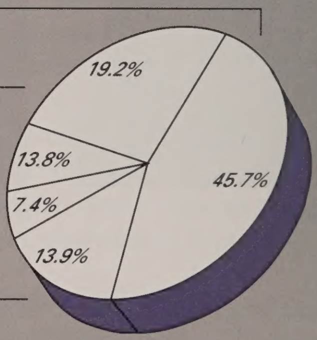
Excerpts from audited financial statements (in thousands of dollars)

Income	1989*	1988
From patient care	$448,322	$409,164
less contractual allowance	108,077	81,732
	340,245	327,432
Research and other specific purposes	115,619	102,423
Other	20,240	19,160
Total Operating Revenue	**$476,104**	**$449,015**

Expenditures		
For operating expenses:		
Salaries and related compensation	$256,290	$242,588
Supplies, expenses, depreciation	149,047	131,624
	405,337	374,212
Research and other specific expenses	86,529	80,051
Total Operating Expenditures	**$491,866**	**$454,263**
less total operating revenue	476,104	449,015
Surplus (Loss) from operations before adjustments	(15,762)	(5,248)
Adjustment for third party payers and change in accounting method	9,570	298
Non-operating income	3,420	3,066
Surplus (Loss)	**($2,772)**	**($1,884)**

*Year ending September 30, 1989

The Hospital's Dollar



Diagnostic and therapeutic services:
House staff, professional staff, drugs, supplies, etc.

Nursing care

Plant and equipment:
Depreciation, interest, energy, telephone, maintenance, rent

Room and board services:
Food, laundry, security, housekeeping

Administrative services:
Computer, accounting, administrative salaries, etc.

MGH Facts and Figures

Beds	1,081	Residents	450
Number of admissions	33,673	Research fellows	461
Number of ambulatory visits	487,768	RNs	1,836
Inpatient surgery	18,727	LPNs	83
Emergency ward visits	66,500	Nursing assistants	98
Day surgery	8,098	Volunteers	1,044
Active staff	1,852	Employees	9,500
Clinical fellows	281		

Chairman's Report

THE FACT that thousands of people who work at the MGH are responsible for the care given to patients is so obvious that it is often overlooked. In our daily lives we seldom have reason to reflect on how this Hospital or any other institution works.

This report is an effort to make us pause for a moment and take stock of the intricate relationships among hundreds of dedicated people and thank them for their contributions toward the well-being of individual patients. I know of no other group of people in not-for-profit institutions nor in business that daily manage a task so complex or with such uniquely serious consequences — life itself. They are physicians, nurses, scientists, therapists, dietitians, transport staff, technicians, trustees, volunteers, secretaries, and so many others.

The work of caring for the sick is made up of countless interactions among these individuals, and a key ingredient to making these interactions so successful is the stability and loyalty of the MGH family led by our physicians. Nearly 60 percent of MGH physicians have served the Hospital for more than ten years. Of the total workforce, 20-year-plus veterans total nearly 1,200. In a transient world, this is a remarkable record.

What sustains such loyalty? Surely there are jobs that pay more and are less difficult. What underpins their dedication — particularly now when the financial health of all hospitals is constantly threatened? The answer must lie in the special, difficult to define character of those who select this work. None of us is a saint, but be assured the MGH community is selfless, compassionate, and willing to reach out to people and take on their greatest burdens. It is a group that is never satisfied with what can be done for patients; it is a group that constantly pushes for ways to do things better for patients and, through research, to get at the fundamental causes of disease.

For those of you reading this report who work at the Hospital, know this: those of us who reflect on your work are often awed and at the same time enormously grateful. On behalf of the Board of Trustees, thank you.

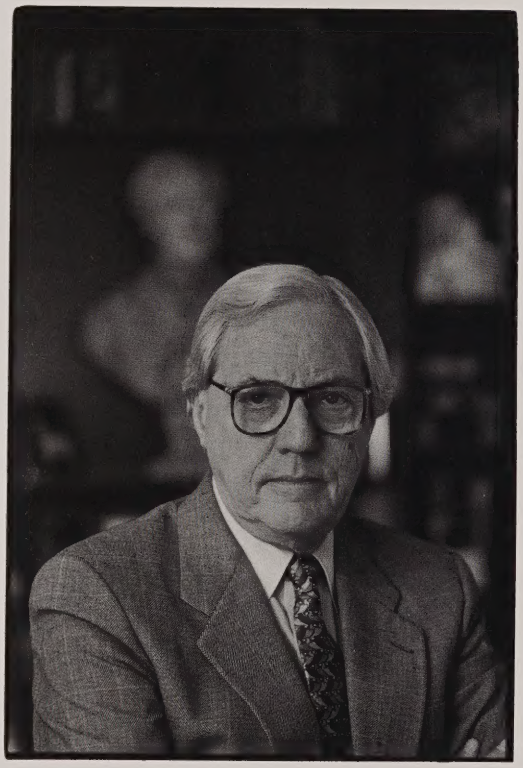
W. Nicholas Thorndike

W. Nicholas Thorndike

General Director's Report

IN SOME respects, the hospital year which closed on September 30, 1989 was paradoxical. In many ways we did very well. To cite just a few:

(1) Our patient care future could be seen towering above our campus. From outside, the 24-story inpatient building looked impressive by year's end. Inside, scores of workmen labored to get patient floors ready to welcome the first group of sick in early spring. About the end of the 1990 fiscal year, the first of the inefficient and long-outmoded inpatient buildings will come down, and a 15-story inpatient structure will eventually rise to complete our transformation into a twenty-first century medical complex.



(2) Our Capital Campaign shows every promise of reaching and perhaps surpassing its goal of $169 million. Although the two new structures will consume much of that sum, many other requisites will benefit. Among them is a medical library where our physicians can keep abreast of rapid advances in patient care, teaching, and research.

(3) Our ability to expand research by leasing Building 149 of the Charlestown Navy Yard has given new promise for advances in biomedical research. The MGH Cancer Center continued to recruit outstanding international scientists. Similarly, the MGH Neuroscience Center was approaching full gear. At year's end the Hospital reported a new center for Building 149. To initiate and support the MGH-Harvard Cutaneous Biology Research Center, Shiseido Ltd. of Japan agreed to provide $85 million over 10 years. An agreement by which Bristol-Myers Squibb would support a major MGH Cardiovascular Research Center was being put in final form. The opening of a magnetic resonance center in Building 149 provides a diagnostic center to reduce the long waiting list for patients on the main campus. At the same time its location made that service available for research in a field (MRI) in which the MGH has pioneered. There were research advances during the year in a number of areas, including multiple sclerosis and AIDS.

The presence of so many outstanding investigators has attracted to the MGH many millions of industrial dollars to establish new research centers. With them has come an awesome responsibility. We have established model agreements that protect our cherished academic freedom. We have also effected a conflict of interest policy to safeguard the integrity of our researchers. These, however, are but frameworks. To continue our high standards we must remain vigilant. Policies are but guidelines which serve as markers for those who must observe and enforce them.

The paradox I referred to at the commencement of this report is this. We have managed these and many other achievements at a time when hospitals and physicians in New York and Massachusetts have faced iniquitous burdens imposed by the states. The millions of new research dollars which we have secured are limited by their source (be it government, industry, or private foundations) to research. They cannot be used to compensate for the patient care shortfall.

In New York, one of the state's two most respected hospitals has chosen to meet its patient care losses by using as much of its once cherished endowment as the law permits. That is an economic chasm without limit. You can cannibalize your endowment only once. When it is gone, you have lost forever the opportunity to preserve the essential qualities which make an outstanding teaching hospital so sought after by patients the world over. *Relatively* speaking, the MGH is doing well. As long as we concentrate our energy on the tasks ahead, we will continue to do well compared to most hospitals. Even those faring relatively soundly, however, will have to continue their struggles with well-intentioned but burdensome regulations to prevent a loss of quality of care while maintaining financial vigor.

Robert Buchanan.

J. Robert Buchanan, M.D.

The Massachusetts General Hospital as of December 31, 1989

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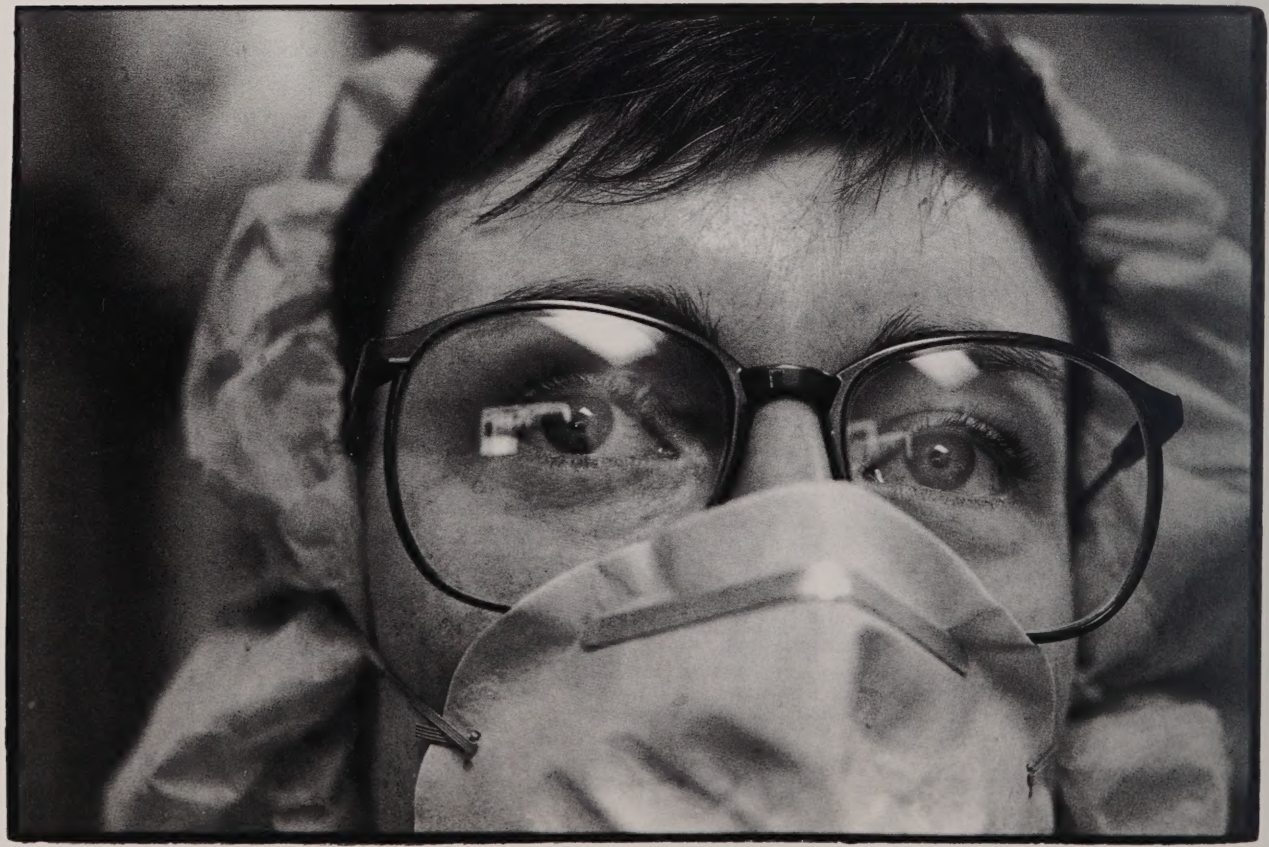

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